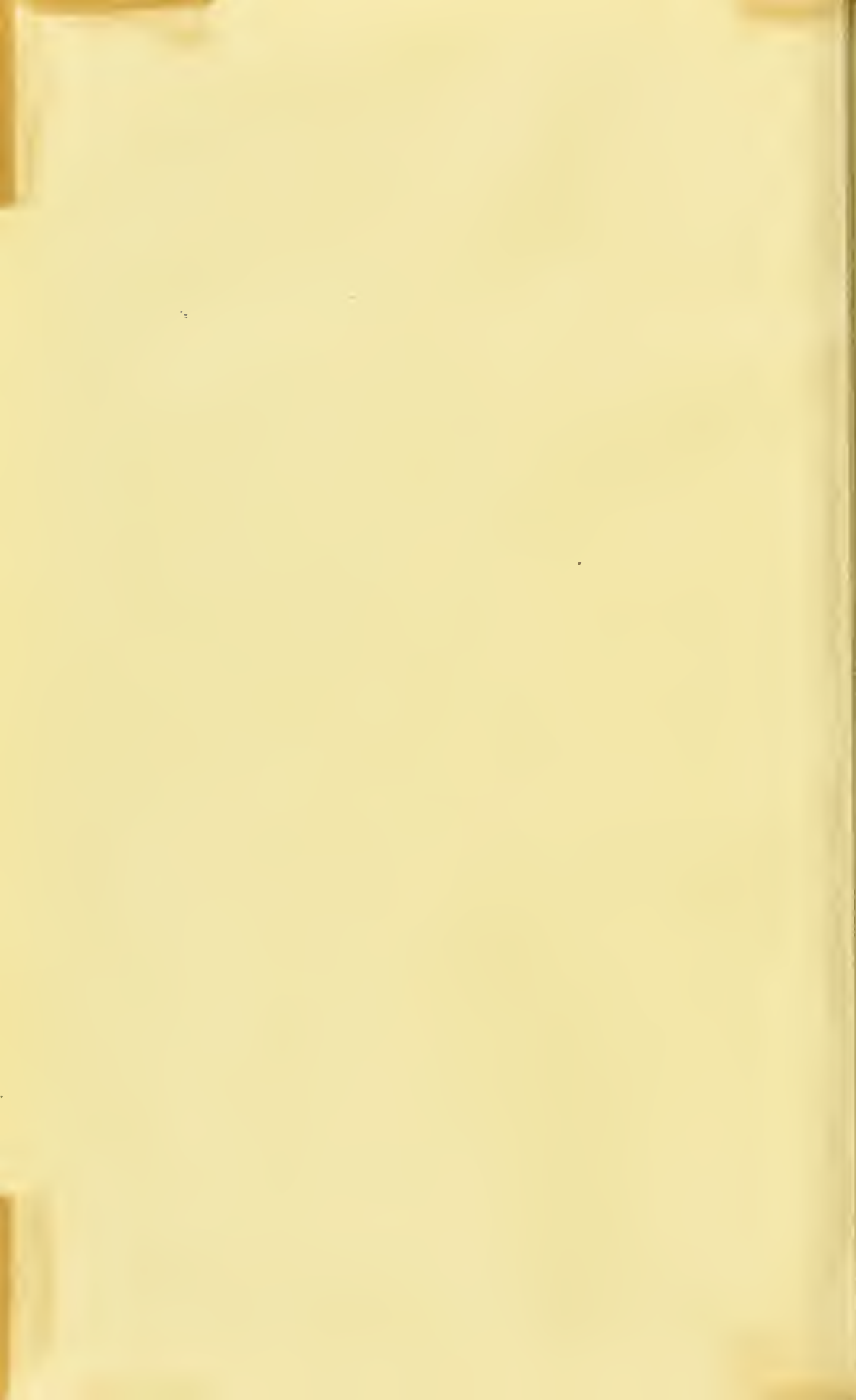





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ESSAY
ON THE
ORIGIN, PROGRESS AND TREATMENT
OF
CHOLERA,
WITH
REMARKS
ON
BERRIBERRI,
AND
DIET,
AS CONNECTED WITH
ENDEMIC AND EPIDEMIC.

BY
JAMES BANKIER, M. D.

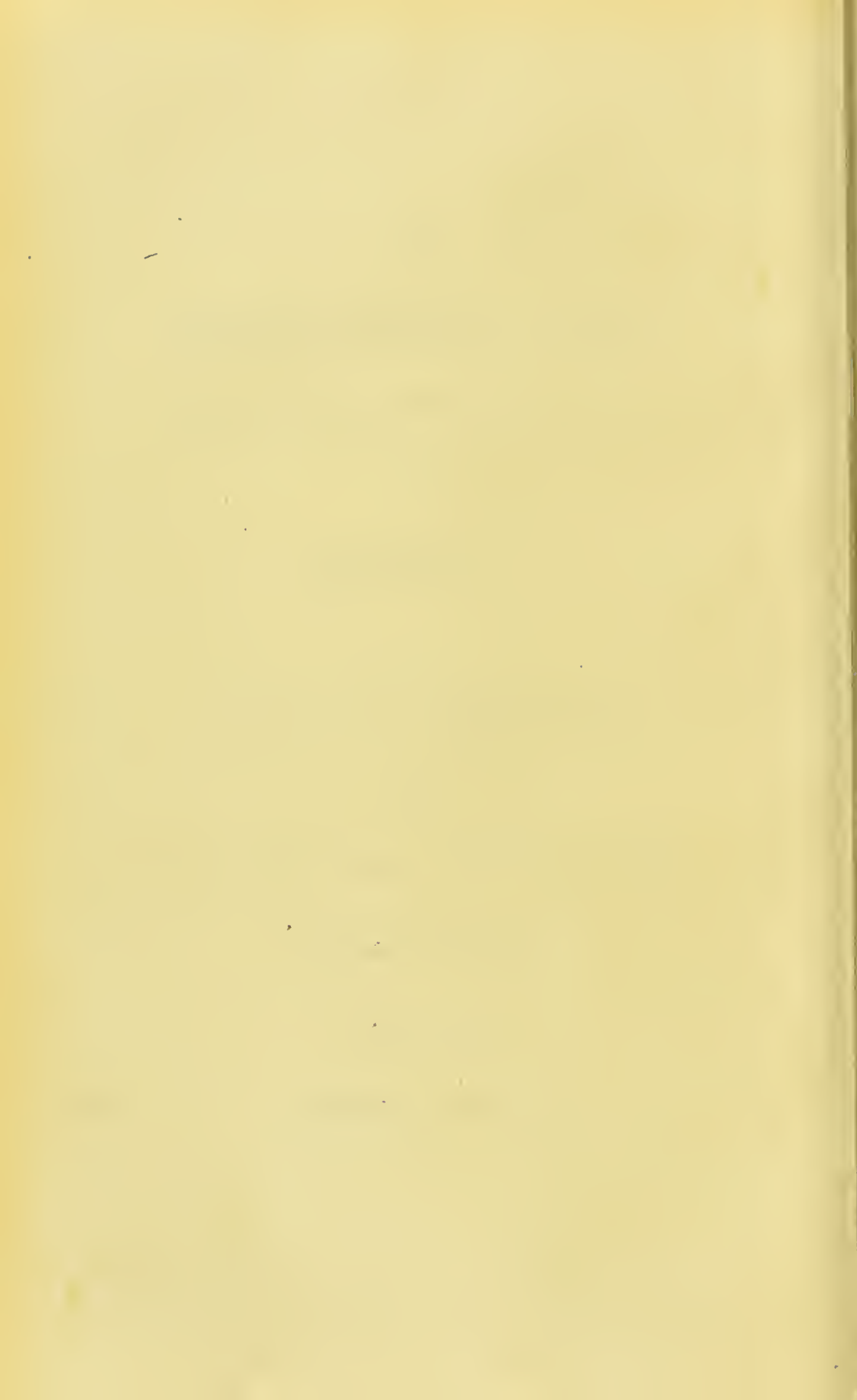
OF THE ROYAL NAVY.

MADRAS:
PRINTED AND PUBLISHED
By J. B. PHAROAH.

MDCCCXXXV.



To
JAMES ANNESLEY, ESQUIRE,
MEMBER OF THE MADRAS MEDICAL BOARD.
AS
A TRIBUTE
OF
RESPECT FOR HIS GENIUS,
AND
GRATITUDE FOR HIS ASSISTANCE,
THE FOLLOWING ESSAY
IS INSCRIBED
BY THE AUTHOR.



P R E F A C E.

IN committing the following *ESSAY*—the result of considerable experience, and mature reflection—to the judgment of the *PUBLIC*, the *AUTHOR* has little to offer. He is aware of its many imperfections, as regards style ; and feels, moreover, that he may be justly charged with prolixity. His chief aim has been to render his views intelligible ; and, if he has succeeded in doing so, he will be quite satisfied to forego all claim to elegance. He considers it a hopeless task to attempt to disarm the hostility of criticism ; but, in justice to himself, he must explain that the work has been prepared under the great disadvantages to which almost all Assistant Surgeons in *THE NAVY* are subjected,—both as regards Books of reference, and opportunity for undisturbed meditation. If this produces no effect on the mind of the professional critic, it may obtain, at the hand of his other

PREFACE.

Medical brethren, some slight indulgence, for many minor errors, which, he knows are scattered over the following pages. He must also avail himself of the present opportunity to acknowledge his great obligations to Mr. J. STIVEN, Assistant Surgeon in the Royal Navy, for many valuable suggestions and remarks, during the preparation of the work.

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INTRODUCTION.

THE importance, and real value, of the acquisition of new Territories, affording scope or attraction to the Natives of Great Britain, must on sober reflection be regarded as depending, in a very high degree, on the diseases which are to be encountered, in contrast with the power or wealth which is to be acquired.

Viewed in this light the Physician, equally with the political economist, will find the regions of India an extensive and interesting field of observation; and although the latter might conclude his labours, by arguing the expediency of preventing our population from proceeding in such numbers to a land in which so many have been cut off, chiefly by *one* of the diseases to which all in that climate are subject; yet the former, instead of resting here, will remember that it is not his own country alone, or the health and happiness of his own countrymen merely, which are to engross, or terminate his exertions, but that his species generally, without regard to locality and the ailments which “human flesh is heir to” in their causes, amelioration,

and possible cure, demand from him researches which must be extended far beyond that limit, and of such a nature as will display a utility, and stamp a dignity and benevolence upon his profession, equal, if not superior, to any that can be claimed by any other human science, or pursuit.

Sir Gilbert Blane observes, in the introductory remarks to his *Medical Logic*, that the production is the “fruits of more than fifty years meditation and experience.”—What an enchanting prospect this holds out for any one undertaking the study of *Medicine*. Our Author, too, was of deep research and practical knowledge, in his own profession, and inferior to few in general attainments. How humiliating it is to think, that so little, of what some may be inclined to call *true* knowledge, can be acquired in such a space of time. It would be injustice, however, for any one to imagine that the instructions contained in the *Logic*, could not be acquired now a days in an incredibly shorter period, by an enterprising, industrious, and ingenious mind. I by no means wish to cast any reflection, were it possible, on Sir Gilbert; for, we know that in the more early part of his career, *Medicine* had not entirely escaped from the deep mist of superstition, and ignorance in which it was enveloped. Man was then but too apt to arrogate to himself principles, which, when properly explained could not be held tenable for a moment. In

the present day things are a *little* altered,—comparatively clear, however, as the atmosphere is, in which medical laws are now placed, it is even yet sufficiently obscure to obstruct our mental vision;—the darkness may be truly considered as but half cleared away, and by no means unfolding the meridian splendours of certain knowledge. There is one point which we of the present day may be proud of, and it must be confessed that it would be a shame were it otherwise—we are better acquainted with the principles of the healing art than the antients. But, even admitting this, we have no great reason to boast; we must remember that we are only the dwarf on the giant's shoulders; although, when so placed, we can see somewhat farther than he, yet he is the structure which upholds us, or more properly the foundation on which we have built. This truism consists in the fact—that the ancients collected all their observations of disease from their own habitation—nature—in so far as related to the actual statement of things present. It is therefore in the statement of symptoms that we may expect them to be most accurate, and those who attentively peruse their works (as every Physician ought) will find them so. The diseases which they detail are generally all strictly correct; any others, although they may approach near to them, if they do not mention every characteristic feature in the complaint, must be an alteration of that, or

this disease, from what it was in their day. Cholera, as it shews itself in its Epidemic form in India, must either therefore be a higher caste of disease, which they witnessed so seldom as to allow it to pass unnoticed, or it must be a new one added to our catalogue. Many may be inclined to believe both positions correct, but most of the present time, it is presumed, will hold to the latter opinion. It would be unreasonable in the extreme to imagine that our forefathers could be as successful in their treatment as we are. The reason of this may at once appear when we take into consideration the paucity of means falling to their share; so much so indeed was this the case, as to preclude the idea entirely; while, from a contrary cause, it might be truly said of us that we ought to be at the acmé of it, as being in possession of such a store of chemical knowledge, as well as an intimate acquaintance with those parts of the Globe, which supply drugs of the most important and valuable nature. Yet, even with all this boasted knowledge, how lamentably deficient are we in the treatment of many diseases of a fierce endemic and epidemic nature. In fine then we may compare the ancients, to a simple substance, and ourselves to a quadruple or even sextuple, if we attempted more it would be found of but little avail, for, although placed on the top of the highest mountain, and with the best eyes, in the most serene day, we could not see round the world, or ex-

plain every thing in it. From the above it may be concluded, that any one endeavouring to scan the whole secrets of nature, must ultimately terminate his efforts in disappointment, if not exhaustion of body and mind.

Sir Gilbert need not be ashamed, and I am confident he is not, when he acknowledges that his "fifty years meditation and experience" have not enabled him to discover the whole governing laws of the medical world; more particularly when it is remembered that the united efforts of all the medical profession either in, or out of India, have as yet done but little in clearing away the mists, or elucidating the cause or causes, the proper treatment, or even satisfactorily pointed out the reason of failure, which so often occurs in the case of Cholera alone.

The cause or causes of this, as well as of many other diseases, have hitherto remained wrapt up in much obscurity, and it is likely that this might continue to be the case for ages to come, did we not apply those laws and phenomena, with other circumstances of which we are in possession to their elucidation. In a task of such magnitude and under all considerations it becomes me to be circumspect, at all events very modest in giving any opinion considering that it has yet, as I have already intimated, bid defiance to the efforts of the whole medical profession. In the prosecution of the enquiry, I may be as unsuccessful as those who have gone before

me, but the very magnitude and difficulty of the subject have stimulated me to the undertaking, and, if I fail, may plead somewhat on my behalf, my attempt in that case will only like those of my predecessors fall into oblivion, or be remembered on account of the illustrations, or opinions advanced. Labouring under the vast load of difficulties which attend an Assistant Surgeon's life on board a Man-of-War,—in particular as regards a defect of books of reference, I have been compelled to form my own opinions on the subject. This so far from being a defect many may say is the very point they wanted: while others *will* be inclined to suppose that in these circumstances nothing of importance can be expected. It does not become me to say anything in extenuation. In the investigation of the various phenomena, I shall commence by accounting for some of those which pervade the whole of the animal creation. As to the treatment, it is to be hoped, there will be shewn evident proofs of our failure, and that this will continue to be the case either in consequence of an improper administration of our remedies, or in consequence of a want of remedies endowed with properties, which none in the pharmacopeia at present appear to possess, at least so far as we are acquainted with their various combinations and actions upon the living body. In short then it is proposed in the following pages to enter as minutely as circumstances

will permit into every point connected with the rise, progress and treatment of the disease. If anything of importance has escaped observation, it is to be hoped that it may be speedily supplied by the observation of others; so that this pestilence may at length be removed from the number of those which form the opprobria medicorum. It is erroneous to suppose that any disease admits only of one method of cure; those who think so, can know but little of the principles of medicine. The Cholera is one, which is so very versatile in its character, as perhaps to admit of as many modifications of treatment, as the habits of the patients are various.



C H A P. I.

CONSERVATIVE PRINCIPLE.

By the term is to be understood that power which living bodies possess of resisting putrefaction for a time, or as Mr. J. Hunter expresses it "the living principle." Many no doubt will be astonished in what manner this can be applicable to the disease in question. The answer is short, my opinion being that it is the living principle which is assailed. I shall, therefore, proceed to the point by considering in what function of the body the conservative power chiefly resides. I observe that dead animal matter becomes most readily putrid at the temperature of 86° to 100° of Fahrenheit ; I would therefore be inclined to say that if this principle of resisting putrefaction is to be given to any *one* set of the functions of the body, it ought to be placed in the nervous, this, however, at present may appear perhaps saying a little too much ; but that it depends on this in combination with a due distribution of uncontaminated blood there can be but little doubt. There are instances in the animal world in which the circulation of the blood can be suspended for a considerable time ; and, when again placed under favourable circumstances, the dormant animal resumes its usual avocations ; such happens in the case of the frog and of some other cold blooded animals. But in warm blooded animals, and particularly in man this never occurs, since we see in cases in which the circulation is impeded, as in old age, how quickly the extreme parts of the body become gangrenous. This however may depend, as I shall afterwards state, on a deficit of the blood, producing a diminution of action in the nerves, and

in such cases we cannot expect that a due performance of vitality in the system, or the parts affected, should be kept going on. I observe then, that in dormant animals, or reptiles in which there is no circulation, or, at least, in such an inconsiderable degree, as not to be admitted in evidence, that the principle of resistance is in existence. To what can we ascribe this power, independent of the cold medium in which they may be placed; surely to none other but their nervous system, these examples however are only brought forward as a helping illustration; we do not admit that such laws can be properly applied to man, for here we will find that these two functions are inseparably connected; when one of them is deficient the other suffers to the extent of the lesion inflicted, and then the part itself, or, this last may be the medium through which the disparity of action is communicated. The conservative principle in man, cannot therefore be looked on as the result of any one action, but must depend on them all in some degree. The body has a constant and arduous struggle to maintain against putrefaction, where such changes in the thermometer exist as above noticed. This power of resistance, it will be admitted, cannot be present in any one animal substance, unless it is endowed to a certain extent with the principles of life;—according as life is evident, either in a major or minor degree, so will the strength of the conservative power be. As applied to warm blooded animals, those that *feel* most, have it in the greatest perfection. I would therefore place it in that function which is possessed of the *sentient* faculty. We might adduce cases of small pox, or other diseases generally called putrid, to prove that such depend on an abstraction of the circulation from the parts, this term however may by some be deemed inadmissible in a certain degree, for where the principles of life are still in exist-

ence, there can be nothing actually putrefactive present, although there may be an approach to it, the above being present there also will be found an analogous resisting power.

On the other hand as we descend the scale of animal existence, do we not find that the putrefactive process commences much more readily in those in which there is a weak nervous power, than in others possessed of a high one, this is more evidently the case under the changes of the atmosphere already noticed. I shall make a few observations on some of the above remarks as points of illustration. Let us take the case of small pox with extreme factor; the parts from which the offensive smell proceeds, although they may not be entirely deprived of their blood, yet have lost all feeling, and under these circumstances we have them in a demisingrenous state. These parts then may be said to suffer in consequence of their nervous supply being almost entirely withdrawn or destroyed, there is always a strong tendency in such cases, when they terminate fatally, of the body running hurriedly to putrefaction, more so than is to be met with in other instances of death, particularly when such occur suddenly. To shew that the principle of resistance is much more durable in those cases of deaths from wounds and other accidents than it is in those from lingering disease we have only to notice how much longer the body of a person shot will resist the putrefactive process, than of one who has died of plague, &c. In the former we will find that putrefaction is long in shewing itself, whereas in the latter, as soon as life has become extinct, the process of decomposition takes place, and will proceed more rapidly than in the other; and this too independently of what may be urged as to the putrefaction of the blood itself, which I do not admit *in toto* to be the

cause of it as will afterwards appear. Hence we draw the conclusion, that when the power of resistance has been strong during life, it will continue so, in a certain degree, after life has become extinct, as it has suffered no lesion, it will not be hurried on so quickly to putrefaction as in the other case in which, this function has been weakened by continued exertion during a severe and lingering illness.

That this principle resides therefore in one of the functions of the body more than another I think will be granted, and that this particular one is the nervous may be as little disputed, since we observe putrefaction takes place more speedily in those cases in which this power is as it were, at once struck dead ; (as in deaths from lightning,) than in such as arise from blows or other mechanical injuries ; in these instances there is more time given for exhausting the power in question than in the former, and the reason is obvious the nervous power is here at once annihilated the blood also suffering in some degree.

Many, no doubt, will object to the above mode of reasoning and say that the conservative principle more immediately resides in the blood, and they will bring forward examples of its obstruction in various parts of the body, to such an extent as to have produced gangrene. I answer that this very obstruction of blood impairs primarily and in a great degree the nervous energy of the part, then under such a condition of things, both must go down hill rapidly, as will afterwards be shewn. It may be gathered from the writings of Sir Gilbert Blane, Mr. J. Hunter and other eminent men that they considered the conservative principle to reside mainly, if not entirely, in one function of the body, but were at a loss to say in which of the actions of life they would place it. The real deduction, however, is that it cannot be said to reside in any one action so far as regards man, and the

warm blooded animals, but that it depends on a due performance of them all ; few will dispute, so far as relates to a proper respiration, a free circulation of the blood and, above all, to an efficient maintenance of nervous play, which depends chiefly on a healthy state of these actions, as I shall endeavour to shew in the following pages, —that all the powers of the body are dominant to the laws of the nervous system. But, although this is highly probable, and as some may say, it even amounts to more than a probability, yet it is not sufficiently apparent, more especially when we observe the various forms of this conservative principle existing from the Zoöphites and all the colder blooded animals, till we come to those of warm blood, and from them trace its increasing power up to man. We see it existing in such varied and seemingly inexplicable forms in vegetables, from the most insignificant plant to the largest tree, as to lead us to the belief that they also are endowed with a conservative principle, or as I would say a nervous power. Now the above is correct, I believe, and is the manner of reasoning adopted by most men on the subject. I will attempt to prove in support of the opinion given that they also are possessed of a nervous power, or at all events of something analogous to it, since it appears that each distinct class of animals or plants has a power of resistance in proportion as it possesses more or less of this conservative principle, and no matter whether it does not reside in the circulation of fluids, or whether it exists in a single or double circulation since, as I have said, those possessing the latter will be found to resist in proportion to it ; the laws which govern them however I again state are not strictly applicable to man. Have we not heard of fields of vegetables, corn, rice, &c. being blighted by the same cause as that producing pestilential diseases? Have we not found in all classes of animals

that death depends upon the degree of susceptibility for receiving these impressions and this too at the very time that they are prevailing? Do such instances not prove that there is one universal cause operating towards the destruction of this power? As to animal and vegetable life becoming dormant for a certain stated time, still I say that although the juices are not circulating, they have a power of resistance, which is not entirely extinct; for the time being, it may be dormant but this only in a certain degree. A tree in winter possesses some of this principle, and it only requires heat to be properly applied, with a certain state of the soil, to enable it to flourish even in that season. It is almost superfluous to observe that if the tree be cut off from communicating with the roots, it will to a certainty die, lop the leg off a dormant frog and the portion soon loses the conservative power, even although there has been little or no circulation of fluid in either case. We see then that heat is of the greatest importance to such a state of life; now it may be stated that in my opinion heat, as it exists in the human body, mainly depends on the nervous power, and I would be also inclined to place the conservative principle more immediately in the power capable of generating it; at the same time I admit that a due performance of the one cannot exist without a healthy action of them all. It may again be asked what has all this to do with Cholera? I answer briefly by adverting to some facts observed by Dr. Davy, in the Island of Ceylon, as regards this disease. There was a "flaccid nature of the muscles;" such a state generally occurs from the speedy operation of some power capable of destroying the conservative principle, whether from the operation of an all-powerful and overwhelming cause, such as happens in those killed by lightning or in animals hunted to death; in such instances the nervous power is

either destroyed or exhausted. " There was also a tenderness of the muscular fibres as in many of the Bombay cases, there was no difference in the *colour* of the arterial and venous blood, and no instance of a *buffy* coat on the blood that was drawn ; which in reality was so *loose* and *uncoagulable* that when venesection was necessary the vessels were opened with the greatest caution from the difficulty of restraining the blood afterwards." If this does not prove that the conservative principle was extinguished I do not know what does, therefore from the above reasoning and more particularly from what is yet to be advanced I am inclined to place the existence of this disease chiefly in the derangement of the nervous system.

C H A P. II.

SYMPATHIES.

" Those who are disposed to depreciate the practical value of anatomy might alledge that there are several important functions, upon which the knowledge of the structure of the dead body though ever so minute and perfect could throw little or no light ; nay that there are some morbid circumstances and indications in the living body, ascertained by empirical observation, in which mere anatomy is more apt to mislead than instruct." Our much respected author has stated facts so far as regards a *traceable* communication anatomically considered can point out. It does not, however, necessarily follow, although we cannot shew it by demonstration, that there is no such thing existing between the external and internal parts of the abdomen. There are many other parts of the body precisely under the same difficulties of illustration as respects disease, and

there are other points of anatomy where we cannot detect the manner in which things of the utmost importance are accomplished. We cannot for example anatomically demonstrate the absorbents of the brain, although we are positive that fluids are removed from this part, as well as others, and it is no matter whether this takes place by nervous absorption or by the undetected absorbents themselves, I here principally allude to the opinions of the major portion of anatomists as to their non-presence. With respect to the surface of the body and the contained viscera, that there is a communication existing, although it cannot be traced between these parts, few of the present day will venture to deny and, although I do not adopt the Cullenian theory in full, concerning the smaller vessels, yet I am inclined to believe as I have stated in the remarks on Dysentery, that such a thing as sympathizing action does exist between the external surface of the abdomen and viscera, also, that this state of things has been much overlooked by some medical men. In short then we must admit that there are such actions as sympathies in the human body; by adopting these opinions we will be enabled to account in the most satisfactory manner for the *non-traceable* phenomena, the existence of which we may be as positive of as of our own. How can we otherwise explain the fact, that the skin is soon drenched with perspiration, after we have drank freely of cold water, when the body is hot, especially in intertropical countries. Upon the hypothesis it will immediately set a going all the minute vessels on the skin, and quicker than I can write the words, the surface will be drenched with perspiration; the liability to the annoyance wears off by length of residence, but it does not entirely leave us at any period.

How else but on the principles of sympathy are we to account for the relief which is obtained in many cases by a discriminating application to the skin of a blister, fomentations, or local blood-letting; this too when applied over the region of the abdomen for the relief of the oppressed viscera, where there is as has been stated no traceable communication, not even of nervous power. The answer may be, it does not necessarily follow that there should be a distinct nervous junction in any, or every instance, in all portions of the body, to give that relief which the above remedies, when judiciously employed, are so well calculated to afford. We know that there exists in every part thereof, more especially of analogous textures, a disposition to sympathize with each other, hence it follows, that even if the smaller vessels, nerves, &c. which ramify in the skin, be relieved, that they also will extend part of this, to the deeper portions, which are assailed; this may be accomplished either through the medium of the *sensorium commune* or by a more direct influence on the abdomen itself, and in proportion to the benefit, the nerves, the other vessels, or the muscles here may have received. The tension of the abdomen being taken off, will operate beneficially on those parts below. But not to leave the subject in the conjectural state, which many might say belongs to it, I shall proceed by illustrating the manner in which fomentations act, in relieving inflammations of the viscera of the abdomen. I mention that they must be continued for some time, or until the more internal parts become heated, then we will find, independently of the external relaxation produced, that in proportion as heat has been communicated to these parts, the bowels, now begin to sympathize, and thus obtain a portion of the benefit which was previously

afforded to the surface. Besides we will perceive that these applications will in some measure equalize the balance of the broken circulation, and consequently take off the stimulus of bulk in the blood vessels. The blood therefore circulating more freely on the surface than before, will leave less to be distributed to the more internal parts, and this is the manner in which a hot bath also gives relief. Care should be taken in some diseases as will afterwards be pointed out, that we only continue this last so long as we find the *stimulus* from the heat to be attended with advantage, and the more particularly so when we do not want any thing like its *sedative* effects. Either from its improper application, as regards the stage of the disease, or its too long duration it will not only do no good but will assuredly be the means of sinking our patients beyond recovery. To prove that heat operates in the manner stated, it is only necessary to apply hot fomentations to the abdomen of a subject in the dissecting room for some time, on opening which we will find the internal viscera warm. This then is the true application of fomentations, and they should be continued for some time, so that they may produce the whole good which they are calculated to effect, provided no untoward circumstances of the patient's habits, or the nature or duration of the disease forbids the application of heat in any form.

The benefit derived from blisters is soon stated, nature, or the laws governing the animal economy seem to be extremely averse to maintain in active operation two diseases, she will therefore divide her attention between them, thus in trial the more severe yields from having part of the *onus* taken off and transferred to the other. That this is in a great measure accomplished through the medium of nervous communication will

afterwards appear when I state my views with regard to inflammation, and point out their proper application. As to the operation of local blood letting, and I shall take that of leeches as the more simple, it acts not only by abstracting a portion of the stimulus of bulk from the system, but by doing so, it relieves the stimulus which *distention* gives to the nerves of the part, and thereby prevents a continuance of suffering from this cause. It must be observed that but little benefit will be derived from it, unless the tension of the abdomen, or other parts, be somewhat considerable, therefore they are either less important than general depletion, or more so, according to the nature of the inflammation and the parts attacked. By having recourse to any or all of the above remedies we render the abdomen more pliable, by relaxing it we give a more free play to the muscles and in this manner remove the stimulus of distention from the viscera, just as we would cut through a fascia in order to give exit to the fluid beneath, which has been the occasion of great excitement, thus we will almost immediately relieve the system.

Now let us look to another part of the subject, and observe in what manner relief is afforded by these remedies in such cases as pleurisy. I have already noticed the general principles which ought to guide us in their application, it is therefore only requisite to bear in mind that local blood-letting affords relief by the abstraction of part of the bulk of the general stimulant, the blood thus giving ease to the nervous system, and secondly by allowing a more free play to the muscular power of the ribs. We must always recollect that every part of the body by means of its nervous power will, and does to a certainty sympathize, with another and distant part, thus we see that man is "fearfully and wonderfully made," for when

relief is given to any part its effect pervades the whole chain of vessels connecting those most distant from it; either propagated to them from the sensorium commune, or, by the direct action of the nervous branches themselves, independently of any assistance from the brain, or medulla spinalis, since we see that the benefit afforded does not require to travel the rounds of the system, as from the extremity of the nervous power to its origin, or from thence again to its extremity. The sympathetic nerve and its ganglia have a wonderful effect in accomplishing this; they obviate the necessity of many such impressions travelling so far as the brain and thereby prevent an immediate disturbance which might otherwise have occurred, but by doing so they may fix disease amongst the viscera of a certain kind. The ganglionic plexuses may be considered as another brain placed in the thorax and abdomen, possessing a regulating or harmonizing action, supplying deficiencies, or quelling disturbances, when there are either too great or too little impressions made on these parts.

There are three different sympathies existing in the body by which diseases can be communicated or alleviated—1. sympathy of communication—2. association—3. equilibrium.

1. The sympathy of communication is that in which one part diseased will communicate disordered action to another and distant part of the body or the adjoining texture, from which we may have the same sort of action or another species of disease induced.

2. Sympathy of association, is when two distant organs are simultaneously affected; I give a familiar example; the tickling of the fauces with a feather will in most instances produce vomiting, this takes place from the sympathy that exists between the upper end of the canal and

stomach, the action thereby induced causes contraction of that viscus, and this aided by the diaphragm, causes the discharge of the contents.

3. Sympathy of equilibrium. Thus the action of a blister in phthisis pulmonalis does good, and its beneficial operation can only be explained on the principle of equilibrium, causing pain on the surface, this of course balances that below. It is worthy of remark that many severe diarrhoeas of children are caused by the nervous sympathy which exists between the head and bowels; whenever therefore we find the purging unwilling to yield, we ought to attempt the cure by applying blisters to the head and the local destruction of blood, as this is the most proper method to pursue in such cases—It very often happens that the sympathy existing between different places may cause a disease to occur at a very great distance from the seat of the injury. Thus a man struck upon the head may have an abscess of the liver, without this last part having received any injury, and this is only to be explained by the nervous communication which exists between the liver and brain, the effect of the blow may be such as to produce inflammation of the brain which may cause an irritative action to the nerves of the liver, and terminate in abscess if we are not active in our treatment.

I shall now stop short with the sympathies to answer the question I have but little doubt many have been asking themselves, what have they to do with Cholera? I answer that it is of the utmost importance that they should be kept in view, as will be afterwards shewn in illustrating the manner in which the cause or causes of this, as well as other diseases, operate on the body, and on that account I could not well pass them over. In their illustration I have made them, when practically considered,

of some moment to the junior branches of the profession and not altogether out of the way to others. In the mean time I go on to the investigation of another important subject that of.

C H A P. III.

ANIMAL HEAT.

I state a few points at the onset which it will be of importance to keep in mind. If the sympathetic nerve in the neck be divided, the head begins to lose its action, and the heat of the animal diminishes. If we cut upon the brain, or disturb it in any way, as in concussion, the heat of the animal decreases very rapidly, and it will diminish in rapidity from the cerebrum till we approach the lumbar vertebrae. Thus an injury inflicted upon the neck will cause the heat to decrease faster than it would do at these vertebrae. Respiration aids but very little in the production of heat; for it has been observed that the animal dies quicker if the respiration be allowed to go on, or kept artificially in play, the body always cooling much faster under these circumstances. There is also attending an injury of the nerves a partial or general paralysis of the system, if the wound penetrates at the ear, there is a paralysis of the greater part of the body, the extremities become cold, and the motion is in such instances lost. In others it is only so for the time being, and although it may gradually return, yet it does so with slowness, and with much less power than formerly, for the animal seldom recovers its former vigour.

Animal heat I believe to be generated in a major degree through the medium of the nervous influence, and to be kept up by an equalization in the circulation of the blood. An instance may be adduced of a want of a pro-

per degree of heat in paralytic affections. A paralytic limb when first attacked, becomes not only motionless, but also loses its temperature, as compared with the other, if healthy, and finally becomes shrivelled or shrunk, especially when the disorder is of long standing. I am well aware that in a few cases of this sort, the parts may gradually recover their heat, this however is seldom to be met with in old bed-ridden patients, from such a cause, as about to be stated. During the night they are not unfrequently heard crying out that the affected limb is colder than the other, and request to have it well covered. This at all events proves that the *feeling* of the injured member is materially affected. When however the injury has been so far recovered from, that the heat of the injured limb is on a par with other sound parts of the body (for here it may be observed that *artificial* heat is but little adequate to keep up the efficient action of the limb, I mean so far as the nervous energy is concerned,) what let me ask has taken place? We are all well aware that nature makes attempts at the restoration of all lesions of the system, sooner or later, she appears to accomplish this through the medium of the uninjured nervous twigs supplied from other sources than those situated at the part which has sustained the injury. The heat is therefore kept up through this medium until its own nerves have sufficiently recovered their energy; somewhat in a similar way that blood is supplied to a limb after the operation for popliteal aneurism. It must at the same time be recollected, that I do not state that these nervous twigs are enlarged, but only that they have an additional stimulus added, so as to enable them to make good the deficiency which they are required to supply. These things can only be expected to

take place, in cases where the injury has been light, or insufficient to destroy the principal nerves of the member. If the paralysis be extensive I apprehend that nothing of this sort can take place. From the above we see an instance of that divine interposition so often met with in the animal economy—nature accommodating herself to existing circumstances. To illustrate the point further, every one knows what takes place after the operation for popliteal aneurism. With the decrease of the circulation there also takes place a diminution in the supply of heat (for we must now look on this as a sort of animal secretion) below the parts operated on. Here the advocates for an opposite opinion may exclaim, this is exactly what must be taken in support of our argument, the circulation being impeded, the heat decreases. Nothing can be more correct. It may be answered, however, that the absence of the heat does not depend upon the deficiency in the circulation, for there is generally enough of blood in the limb from the anastomosing branches to maintain the *life* of the part, although this may be in a minor degree, but from some other cause which they may not be inclined readily to admit. What will they say to this deficiency of the circulation, acting in such a manner as to abstract the nervous stimulus from the very nerves ramifying in the limb; for this fluid I apprehend is one of the exciting agents to the nervous system, not only at its fount, but also through every portion of it, and that these two functions act reciprocally on each other, and the blood in proportion to its purity on the whole, when impure we may certainly expect to have some disturbance in the body. What takes place after the circulation becomes more freely established? The heat of the limb becomes natural in proportion to its restoration, the functions of the parts being thereby gradually

restored. Here again my opponents will say any one may plainly perceive, that when the blood circulates with freedom, the heat is restored, nothing then is more plain to us than that heat must be produced by the blood. I have only to say that I gave them one example of perfect circulation with a decrease of temperature, in the case of paralysis and now it may be added, that the nerves are supplied with a due degree of stimulus, and that they will act well. How can this be, they ask seeing that the main branches of the nerves have not been touched in this last instance, they of course will continue to act well no matter what the state of the circulation. Here also I answer that the nervous influence of parts is kept up by a due degree of blood supplied them through their whole extent, and that the nerves are not only capable of being stimulated at their extremities, but throughout their course, by the blood as well as by other stimulants ; so that an action once commenced at the extremities, may in certain instances be propagated to their origins, and *vice versa*, such may be observed in metastasis, or the transplanting of disease by the medium of sympathetic action, from one part of the system to another, as sometimes happens in gout or gun-shot wounds. I am therefore of opinion that a proper distribution of the blood is necessary to a due degree of nervous energy being kept up.

Let us pursue this highly interesting subject a little further, I ask what is the effect produced by the application of a superabundant quantity of heat, in an artificial way, to the case of aneurism above noticed, or to an amputated limb, or to severe frost-bitten parts, or I may add a hearty meal after long fasting and exposure to excessive fatigue. If the heat is over and above that which ought to be applied, the parts are to a certainty as effectually destroyed as if gangrene had already occurred,

merely from the application of an over degree of stimulus which they cannot withstand. Those who choose to refute these and the following opinions, I have no doubt will be well aware that such things do occur, and, if they are sufficiently grounded in the general principles of surgery, they must also admit that it is one of the most dangerous things possible to apply too much artificial heat in such cases. For, the parts are now weak, under temperature, and cannot withstand this stimulus. The nervous energy of the parts is hereby increased, heat is soon present in these places themselves, over and above the healthy standard. I could give some examples from my own observation, but pass them over, contenting myself with the fact as above stated. Now in what manner does this increase of heat and action occur, not from an increase in the circulation, for in aneurism, or even sometimes in amputations this cannot be the case, the heat we contend is materially lessened, from an abstraction of the blood, and thereby causes a deficient supply to the nerves. The manner in which the supply of artificial heat, greater than is compatible with the now decreased energy of the part, acts may now be stated. It produces an excitement in the extremity of the nerves, and being carried from thence to their origins, causes an irritation or stimulation through the system generally; now this may come to reach the diseased parts themselves, thereby constituting what was at first a local, into a constitutional complaint. Many examples of a similar sort could be given, but those advanced will be sufficient to establish the point in question. Why have I instanced hunger after long fatigue as producing the same effects. If people in these circumstances are allowed to eat freely, we will have many patients, amongst a boat's crew, or any other body of men, who may have been un-

fortunately exposed to them. Care must therefore be taken at first that they have not too much of *warm* liquids, or even solids allowed them ; we must have recourse to those articles gradatim, as the stomach and powers of the body will admit them to be used with safety ; if unfortunately the men are otherwise treated, the system is soon thrown into over-action, and will be in the utmost danger of being overpowered. I give two other familiar examples of the nerves being the medium through which heat is supplied. Pressure for some time against the nerves in the hams or armpits will not only cause a want of sensation in the parts that are supplied from them, but will also cause them to *feel* colder than those of the other limb for some time after. Another example of nerves supplying heat in the *first* instance, and then an excitement of the vascular action, may be deduced from the act of blushing, for every one knows and I dare say has felt a glow of heat in his cheeks, before anything like a blush was apparent.

In addition to what has already been stated as to the production of animal heat not being dependent in a major degree on the circulation of the blood, so far as the fluid itself is concerned, it will be proper to go on with the illustration of the question. A vessel filled with water and set a boiling, we cannot make the water hotter by any means, so long as we allow the steam to escape, even by supplying as much fuel as we please, since its capacity for heat at the boiling point is only 212°. The reason that the water cannot be rendered hotter is, that the heat which accumulates at the bottom and sides of the vessel rises to the surface, and flies off in the vapour, in this way then is the superabundant quantity got rid off, the thermometer, therefore, must always stand at the boiling point. We may, perhaps, from this draw

something regarding the evolution of heat in the human body. We know that the temperature of the blood under all circumstances is about 98° ; this is generally the case under whatever alteration of temperature the body may be exposed. If, however, a greater proportion of heat is present than the man can well withstand, it must either accumulate in the system, or be got rid of in some other manner. The way in which this is sometimes, or generally accomplished is by the perspiration, which we may, for the sake of illustration, consider as something analogous to the process of evaporation from the boiling water. This being allowed, the solution of the question becomes easy. But if the heat, in either instance, be shut in, then there must be either a bursting of the vessel, or disease engendered in the system. Perspiration then is to be looked on as the cooling process by which the body gets rid of its redundant heat, and by which it is maintained at a pretty uniform standard; this too in almost any clime of moderate degrees of temperature, provided the person has done nothing to heat himself, by giving an increased impetus to his nervous system, and thereby adding activity to the circulation. We may thus easily perceive the manner in which an accumulation of heat in the body engenders disease, in those who have not the regulating medium in a proper state, and it particularly manifests itself on those parts which from their bulk are most susceptible of its actions, such as the liver, brain or bowels, &c. this is pre-eminently the case in hot climates. It is unnecessary here to say what the effects, or ultimate terminations of these primary disorders may lead to.

Thus, then, have I accounted for the general laws which are at present allowed to be tenable; as yet little, or nothing, has been said in respect of the nervous play

in the above processes. Having stated what takes place from the flow of perspiration, our attention may now be directed to some other phenomena attending the production, or generation of animal heat, since we often see it reduced when the body has been exceedingly hot, without perspiration taking place, consequently the reduction of temperature cannot be supposed to depend on the insensible perspiration, even although the blood be 98° and the heat of the body above 100° . Let us turn our attention to a patient in a bath of 112° or upwards, here we will find that after he has been in it for some time, his body will return to the same degree of heat as when he was immersed, but this is not a healthy man, it might be better to take one in health, when the body is very hot, or even of the ordinary temperature, place him in the bath, here we can have little doubt as to the result, so far as regards the thermometrical observations, which will not, especially in the latter instance, be materially altered in his new position. In such cases there can be no *evaporation* from the surface by the process of perspiration, although he may be perspiring copiously. This objection is met by a sort of ingenious hypothesis of Dr. Currie, he says that the process of perspiration is a cooling one, even when engendered internally, and before it breaks out on the surface, this is to be ascribed, he says, to the circumstance of this fluid having a greater capacity for heat than the blood, and thus absorbing or reducing the temperature in the moment of its formation ! that a fluid exists in the blood capable of doing this is certainly a very ingenious thought. The heat surely must be *latent*, for it does not seem to shew itself in any other way than by its evaporation on the surface in a dry day ; for when any one is wet with sweat, in one that is damp or rainy, he will by no means

be greatly benefitted by perspiration, but this may add much to his annoyance or disquiet. Why does this cooling process not occur in the case of a patient who has been sweating in bed for hours together, if the perspiration be a cooling process, at the moment of its formation, we ought to have hectic patients in a cold climate almost frozen to death in winter, and the blood robbed of much of its heat. Some may think that we should be more cool and comfortable in a hot climate than we usually are, or even in bed, the parts that are covered with perspiration should feel the coolest, especially when not exposed to any current of air, but we all know that such is not the case; the reason of this some may alledge to be very obvious, in saying, that it is only superabundant heat which this process carries from the system, and that it is constantly engendered under such circumstances. Such a notion may be well enough adapted for those who think that such properties exist in the perspired matter as generated in the living body, and this too in the warm bath above all other places. To me it appears that such a process as the "absorbing or reducing the temperature at the moment of its formation" cannot take place, or even be admitted on chemical principles, or any other known laws, to the extent required to account for it. To what then are we to look for the solving of the phenomenon. The nervous system is that alone through which it can be satisfactorily accounted for; since by accommodating itself to existing circumstances, by some laws of its own, it produces a uniformity of action as regards temperature, either in a hot or cold climate; to this power therefore are we to ascribe the phenomena which take place in the animal machine for withstanding the ennui, and oppression of the one, or the over bracing effects of the other, as well as all the cold chills and other

attendants on it. Those who wish to prosecute the subject experimentally will find it so, and that the temperature of the human body is pretty uniformly the same in all climates, under the ordinary circumstances at present met with. Let us take the case of patients, however, in whom there exist frost-bitten parts, or those so severely benumbed with cold as to resemble more half-dead animal matter than living. The parts here are so deadened as to destroy, for the time being, the influence of nervous supply, but let them be warmed a little, if the heat be over and above that which ought to have been used we have to a certainty an increase of action, with every probability of serious consequences about to ensue, this does not entirely depend on the sudden supply of blood to them as the cause of all this disturbance, but is to be explained on the supposition of an over excitement of the nervous power of the part, as I have shewn in the case of aneurism, and I also state that such an occurrence would have taken place from a continued supply of artificial heat, even although the blood was circulating in a minor degree. Besides this very irritation of the nerves causes an increase of action there, this may appear at once evident, from a greater impulse being given to the circulation of the blood, where we have no mechanical obstruction existing, than in those instances in which it is present and in other parts of the body. Every one knows that in phlegmon and in a paronychia, that the arteries of the part beat more forcibly, and more frequently than elsewhere, which is to be explained on an increase of stimulus being given to the nerves of the diseased part, thereby causing an increased action of the vessels, and this applies also to other portions of the system. The blood vessels therefore are plainly under the influence of the nervous power, as well as all other parts of the sys-

tem depending on them in a major degree for their vitality. The above borders on some points, connected with the causes of inflammation, which I pass over for the present. By the above reasoning we may explain the manner in which inflammation of some parts is produced, and this too on the principles of the sympathy of communication.

Other objections I start as to the blood being the generating power of heat, and state that in febrile affections we may not unfrequently observe a profuse perspiration, under certain circumstances, not by any means carrying off the superabundant heat, or even lessening this in almost any perceptible degree, therefore it is but reasonable to conclude that it is not the only process by which the body is cooled, or that it even reduces the temperature "at the moment of its formation." I have already stated the agents which do this without the perspiration. From the above, the inference may be drawn, that there is a natural, as also a morbid animal heat, according as the individual is in health or disease, that these two states of heat depend on something else than the generating power of the blood at the temperature of 98° , even when the circulation is slow or quick, and are independent of chemical laws, so far as these have any influence over living animal matter. But do not imagine that I lose sight of the action of the blood as assisting in the production of this; by no means, for we must find that there is a sort of reciprocal action between the two powers, neither let any conclude that I for a moment think that the blood is the governing, or regulating power in accomplishing this important process. The blood is necessary for keeping up a due stimulus to the nervous system, from which it, in its turn, even receives its vitality! In this way then are we enabled to

account for some actions that depend on vital principles alone; as well as the impressions made on the sensorium commune, through the medium of the external or internal *sentient* faculties or organs. I may add that, on the supposition that the blood is the only means of propagating heat, it might be difficult to account for the skin in fever determinately retaining its heat and dryness, until a certain period, then all at once becoming drenched with perspiration. Why, let me ask, does not perspiration occur upon the reaction, and the heat of fevers? Why does an intermittent in England so frequently go through its three stages of cold, hot, and sweating, each lasting for a considerable time? Why does not the sweating occur in the *hot* stage? I have stated that perspiration does not remove the heat in many instances; even from this we may conclude that it depends on the nervous power, and also that there is a difference between the production of heat in certain cases as regards perspiration carrying this off, as well as that there is a dry heat of the surface capable of being maintained independently of the state of the circulation, and according to the condition of our patient. Why is it that, at the commencement, or even during the progress of fever, or other diseases, the under part of the body will be preternaturally hot, with the upper portion cold, or the reverse, both places being exactly under the same conditions as regards covering, and the natural distribution of the blood?—this others as well as myself have experienced much to our annoyance. In cholera the patient not unfrequently complains of great heat, just as happens in some cases of fever—for example, typhus, in which, while the body actually feels colder to the hands of another, the feeling to the patient is sensible and acute, therefore, he often complains of it.

It is truly astonishing, when Sir Gilbert Blane was perfectly aware of the fact, that in amphibious tribes and fishes the standard of heat is but very little above that of the circulating medium, and with a power of resistance in maintaining their specific temperature either in cold or torrid climes such as not to alter it, that he did not look for some other power than the blood in order to obtain a satisfactory explanation. He says "that temperature is both raised and depressed by some power essentially inherent in life"———"this is most observable in birds, for in those, even of the smallest size, the natural heat is ten or twelve degrees above the human." Had Sir Gilbert's attention only been directed for a moment to the nervous system, it is thought that this circumstance could not have escaped his deep penetration after more than "fifty years meditation and experience." Such however is the fallacy of human reasoning and human pursuits, that we are but too apt, even as logicians, to pin our faith to an honoured theory, or for the support of that most important discovery of Harvey; so much so indeed, that we may possibly give it more influence over the phenomena of life than even its splendid author could have contemplated. I am afraid that in the present time it has received a shock of diminution from which it may not easily recover, in so far as it attempts to explain the generating power of animal heat, when this is considered as the primary principle of production, and I am still the more astonished at the upholding of this doctrine when we have the following from the author above quoted. "When it is considered how immeasurably greater the abstracting power of the atmosphere is in these small bodies, in consequence of the ratio of their surface being as the square of their mass it is *utterly impossible to account for this on chemical*

“principles and must depend on a specific generating
 “power furnished in various degrees to the respective
 “species of animals, and it must be astonishingly great
 “in small animals to enable them to resist the strong
 “power of abstraction in the external medium. This
 “argument is rendered still more strong by what is
 “found to take place with regard to some insects. Let
 “the bulb of a thermometer be thrust into a swarm of
 “bees, the heat will be 97° or 98° that is as high as the
 “living human body.” This last circumstance of
 course can only be properly explained on the suppo-
 sition of accumulated heat. None for a moment will
 suppose that a bee is capable of raising the thermometer
 to 98° , thus evidently shewing the source from which the
 heat is derived. It is the more remarkable however,
 that he does not attempt to account for the existence of
 this principle more particularly, when we find him
 making use of the words in Italics. I am almost irre-
 sistibly lead to the conclusion that our author, although
 he does not, and perhaps was rather unwilling to express
 it, must have been aware that there did exist some other
 power than the circulation of the blood for regulating
 the animal temperature. This very passage must have
 called the attention of others to the investigation, hence the
 important results which lead us to an opposite conclusion.

Sir Gilbert, as well as very many others the advo-
 cates of the opinion, that heat is generated through the
 medium of the circulation, believed that oxygen the
 supporter of combustion is indispensibly requisite for
 a due supply of animal heat. But life, although in this
 way compared to a lamp continually burning, and the
 comparison, for aught I know, may be apt enough, yet
 it may be safely stated that man is not a lamp, and that
 the blood is not the means through which this species

of vitality is kept in play. The simile might possibly apply could we see, or even suppose, that the body of man was the vessel and the blood as influenced by the nerves the oil, but this vital oil would not act without some power to put it in action. The nerves, therefore, affording vitality to the blood may thus cause it to shew light to the whole body, and in this way the secret and invisible fire may be kept in a continual glow. This is, however, wandering a little from the point; a due supply of oxygen is furnished merely with the idea of *purifying* not *heating* the blood; this must be the case if we view *life* as consisting of a multiplicity of actions, each depending in a great degree on another, and all in particular on the due and efficient performance of the nervous power, as well as, the supply of blood; these two systems go hand in hand together, and the nerves will continue to act so long as the blood is properly purified, and regularly transmitted to the different compartments of the body. Oxygen will only give heat under certain circumstances, and we all know well, that it is a supporter of combustion, but the *flame*, or a sufficient degree of heat, must first be in existence ere this can take place. I am well aware that the sun's influence producing the various orders of divisible prismatic colours in its different rays, each of them, according to its colour, possessing more heat than the others, even one of them as it has been stated is in possession of magnetic or magnetizing powers, may have something of a specific action on the production of animal heat, so far as the selecting power of the blood is concerned, and that it may be absorbed, when the air is presented to the large expanse of the lungs on purpose for purification, but through what distinct medium or action it is accomplished does not appear, nor do I mean to inquire into it, suffice it to say

that oxygen in any degree of purity does not give the heat to the blood, since those who breathed a more pure air, or those in an atmosphere to which a quantity of oxygen was added, would be hotter than other people, but this is far from being the case. Our author (and I like to keep by one when he is very good) however states that oxygen is furnished for this purpose, and that this "is extremely plausible when it is considered that the specific temperature of different orders of animals, holds a striking proportion to their intercourse with the atmosphere, as is obvious in the gradations of mammalia, amphibia and fishes." It is added in a note that "the arterial blood was also found to be warmer than the venous by Dr. Davy." Now amongst the vast mass of animals the above intercourse with the atmosphere may be, and actually is, requisite for their existence, and I may add only for the purpose of purifying the blood. I would say, when taking a survey of animated nature, and drawing inferences from the various departments of life, that the opinions advanced in the quotation are extremely improbable, since the very circumstance of the amphibia and mammalia being obliged to have such frequent "intercourse with the atmosphere" is for far other purposes than accomplishing the first indication. Can any one for a moment suppose that this intercourse is for the purpose of imbibing *cold* air to *warm* themselves. It is therefore for the purification of their blood, not for the support of their temperatures, and in proportion to the purity of the blood, so will they have this more or less fully accomplished. What will be said as to the whales in the colder regions coming up to *blow*, by this process they must inhale the almost frozen atmosphere, and even man himself, there, does the same : can this be supposed I say again for the purpose of giving

warmth, or contributing in any degree to their heat, so far as this depends on the imbibing principle of the blood, no, no, I should say that, as oxygen is indispensibly necessary for carrying on the processes of life, it is taken into the lungs solely for the purpose of purifying the blood, so that, the nervous power may be kept in proper activity, and that the pure blood is carried about to every part of the system as a proper stimulus, and that this is one of the actions it serves, is rendered extremely probable when we consider the manner of life of all the warm blooded animals, and this, the more especially, when we take into account the nature of some parts of the circulating system as relating to vegetable life. We have seen that the tree retains its conservative power, even although the juices are not circulating.

I am somewhat astonished that the above points should have been so little attended to, the more especially when we have the following from our favourite author. "But on the other hand a degree of heat above
 "the external medium remains in the torpid animals during their hybernation, *though they do not breathe*.
 "It is a fact incontrovertibly attested by Portal and
 "other writers, that after death from apoplexy, the temperature of the body is *maintained* beyond the natural
 "standard, to a period beyond that in which it would be
 "totally abstracted from the like mass of inanimate matter. Dr. Badenoeh, in a work of the diseases of India,
 "ascertained by repeated and accurate experiments, that
 "the heat of those who die by a *coup de soleil* or insolation continues for a considerable time, four hours after
 "death the heat felt to his hand as if it had been five or
 "six degrees higher than in life and health. If the heat
 "of the body depended on respiration alone, any one
 "might by a voluntary effort of quick, deep and long re-

" spiration, increase the temperature of his body at will.
 " I myself as well as others have tried this without ef-
 " fect. However, therefore, the introduction of oxygen
 " may be the occasional means of exciting or supplying
 " heat, it cannot possibly be the *exclusive* and constitu-
 " ent cause in all cases." If not in all cases, I may add
 that in no one case of animals that respire, and with
 warm blood, can we allow it to be a cause. I have intro-
 duced the above lengthy paragraph for the support of my
 opinions, with respect to the conversative power, as well
 as that of the present question. In the above quotation
 we have as conclusive evidence as could be wished re-
 garding the nature of heat not being dependent on the
 blood solely for its existence. The observations of Dr.
 Davy on the arterial and venous blood I will
 admit, he may even go to the extent of a degree or so
 more; can the Doctor, or any other Physiologist, tell
 me the reason why the heat of some parts of the body is
 sometimes much above par, as compared with what it is
 in other places of the same patient, nay than those even
 which are more directly supplied from the fountain head,
 besides, these last ought at all times to be much hotter
 than the extremities, this is not to the extent that might
 be supposed, and the reason why may now appear. How
 can he, or others, account for the above if they continue
 to maintain, that the heat of the body depends on this
 very small increase of temperature in the arterial blood,
 when we see the different parts of the body presenting
 various degrees of temperature, according to the propor-
 tion of nervous power with which they are supplied, this too is
 more conspicuously the case under certain forms of dis-
 ease. Let them answer what power there is in the body of
 resisting the extremes of heat and cold between 112° above
 and 32° below Zero, yet the temperature of the main

part of the body remains pretty much the same in both instances. "It is obvious on the least reflection, that a uniform temperature of the body, such as actually takes place in nature, could not be maintained under the ordinary vicissitudes of the atmosphere without this regulating principle. The effect of the emotions of the mind also in generating both heat and cold, is proof sufficient of temperature depending on a vital and not a chemical cause, such as mixture, fermentation or a mechanical one, such as attrition." It is added "the affections of the nervous system do without doubt influence temperature both by exciting and depressing it. But it does not follow that these affections any more than oxygen constitutes this power, for heat is known to exist independently of its propagation by external bodies, not only in cases where there is neither consciousness nor sensation, but where there is no nervous system, and even where there is no organization as in the fluids." It may be proper to investigate into the above; and in the first place it is admitted that the nervous system influences the temperature either by increasing or depressing it." As this is what I argue I shall pass it over, the other part of the sentence is what we have to contend with. When heat is present in any animated substance, independently of its propagation from external bodies, not only in cases where there is neither consciousness nor sensation, but even where there is no nervous system, and even when there is no organization as in the fluids; under all or any one of these circumstances I admit, for who would not, that heat may be present, who is there that has seen cases of the absence of all sense and motion from various diseases of the human body, and will deny that the heat is entirely lost. In fine I answer this part of the question by bringing forward the cases

of deaths from apoplexy, *coup de soleil* and in some cases of fevers which quickly run their course ; in these the heat of the body continues for a length of time, and proves the fallacy of the opinion, since such cases are in a manner now inanimate matter; but let the motion of a limb be lost, then it quickly feels colder, and is actually so, even although the circulation is going on. I may state that, on the evening of the 23d July 1834, a patient died of fever, after four day's duration, in H. M. S. *Melville* while at the Mauritius. Next morning, or *nine* hours after, his body was as warm as that of a person in health ; the thermometer, when placed under the armpits, actually rose to 97° , and every part of the body was proportionally warm although it had lain upwards of *eight* hours between two ports, with a current of air passing over it, only covered with the Union Jack, which every one knows is not very capable of confining the heat,—it is made of what nautical men call *bunting*, a species of very light worsted substance. Where then could the heat proceed from in this instance, surely not from the blood, for the blood vessels, the arteries I mean, were empty on inspection. By referring to the statement given as regards the conservative principle, the explanation will be found to be that where persons, in previous good health, die suddenly, the whole of the nervous power is not exhausted, therefore the heat of the body may generally be found high, but this only holds in certain diseases. To proceed with our subject, if Sir Gilbert confines his statement to the cases in which there is no nervous system, I ask where will he find any thing possessed of vitality, in which there is a greater degree of heat than in the medium in which it is placed, and in its capacity for it, that can support the argument, also in which he can as distinctly state that there is a circulation, as he has done when he says that there is

an absence of the nervous system. I am afraid that this would be difficult to do.

If we look to vegetable life for proofs I will willingly accompany, let my opponents only state in the first place the class of plants they select, let them say whether they are, or are not possessed of a nervous power, this either weak, or strong, at all events, whether there is not something analogous to it. It may be stated generally that every substance possessed of vitality, whether belonging to the animal or vegetable kingdoms, has under existing circumstances an inherent power of absorbing heat from the medium in which it is placed, or it has the power of generating it *se ipso*; this is more especially the case in those instances possessed of a circulating fluid which has a something surely to stimulate or bring it into operation, and we will find that the power communicated from this source, acts much in the same way that nerves do in the bodies of the warm blooded animals. Whether this power proceeds from the influence of the sun's rays, or the warmth of the atmosphere, or the shooting of the roots of the trees or shrubs further into the soil, it may not be of much consequence to determine, since we observe such to take place even in winter, although the surface of the ground be lightly covered with snow. Now, in the latter examples the roots are kept warmer by their proceeding further into the earth, otherwise the plants could not live; it is the heat from this source, as well as elsewhere, that supplies them with that species of vitality sufficient for their existence and preservation, until the more happy period of a summer's sun calls the whole into more active operation. What a change is now produced, this can be as easily perceived by the *docti* as the *indocti*, by the naturalist as the clown; its wonders, however, can only be fully ascertained by a

mind directed to the investigation of its physiological department, it will then see reason to conclude that there is something analogous to the nervous system, and that such exists in a great measure in the influence of the sun, whose heat puts in operation those powers which cause the sap to be taken up from the earth, and to ascend the parent stem ; this circulating through the various vessels of the branches gives *umbrage* to the whole. I also state that some plants are themselves possessed of a degree of heat, sufficient to thaw the snow or hoar frost that lies about them in winter. This is a beautiful provision of nature, and depends greatly on the state of the weather either before or after the snow has fallen, or the length of time it remains, and the many other circumstances by which such is attended. We know well that a long and severe frost will destroy the best crops of barley, wheat, oats, &c. It is also well known that a few hours sun-shine, during a winter's day, will cause plants to give out so much heat as to thaw the snow to a limited distance around them, it is fortunate that such is the case for thus, by their own powers, do they gradually assimilate the temperature of the surrounding medium to their weak power of withstanding heat or cold, and in this manner save themselves. Let us take a lesson from this, and only apply that degree of cold or heat, in any disease, commensurate with the present vitality. Do not let us any longer observe medical men using extremes of these remedies, so as to act powerfully towards the destruction either of the parts, or of the whole body. I trust that I will plainly shew that the hot bath of 110° , or upwards, is one of the worst measures we can pursue in any case, in which the surface of the body is so low as 60°

or 70° of Fahrenheit. In all cases in which we apply heat or cold this ought to be done a few degrees above or below the state of vitality of the parts, or, in a few other instances, according to the nature of the disease; more than this (say a maximum of five or six degrees) would tend to the certain destruction either of the patient or part. Look at the plants which melt the snow to their own temperatures, or to that which they are capable of enduring without material injury, and say if this is not another instance of interposition for their preservation. The above remarks apply more properly to cases in which the greater part, or the whole of the nervous system is involved, such as in cholera, frost bitten parts, &c. ; but to our subject. If the shoots, however, are but barely appearing above the soft and pliable snow, we may even here mark a change of colour which is produced by the influence of the sun's rays. In either case they must imbibe a quantity of heat, this, although small, is sufficient for the maintenance of life, and as the snow thaws they continue to give out heat so as to reduce the temperature of the surrounding medium ; in this they are much assisted by the shelter and support they derive from the soil. Do we not observe that when the day in winter has been rather warm, or attended by sunshine, and followed by severe cold in the evening, that plants are apt to perish, and often die, the reason is obvious—they have been too much excited by the previous sunshine, and now the cold at night, exceeding that which they are capable of bearing, causes them to decay. Do such things not shew that there is something very noxious in the atmosphere at such times, and what let me ask is to prevent the presence of other ingredients at other times, capable of proving injurious to animal and vegetable life?

I apprehend the more we look into the laws and wonder workings of nature the more we will find to admire. We may even see the most stunted scale of existence, whether in the one class or other, when not possessed of a traceable nervous power, blessed with a something in this way, and find that it is acted on by the influence of external heat, or that of the medium in which it is placed. It is a well known fact that light is divisible into different rays, some of them possessing heat ; it does not seem preposterous, therefore, to imagine that plants, or other substances in the vegetable, and lower orders of animal life, may be kept alive by absorbing these calorific rays. Animals, under these circumstances, only exist as plants do. Some may object to the above reasoning, by saying that plants or other substances have not the power of selection, or are incapable of separating these rays. How can we know that they imbibe heat, it is surely more reasonable to suppose that they have this power, slender as it may be, than that they have not, and that it is always adequate to keep up their very limited existence : they are surely as capable of doing this as inanimate bodies which absorb heat from the atmosphere according to their different capacities for it. Here would be a fine field for expatiating on the different effects of colour and texture, but I pass it over, allowing those who have more leisure to prosecute it.

As to heat being in fluids, where there is no organization, it may be answered shortly by stating, that where there is no heat present, there can be no life, and where there is no life, we are at the end of the subject, since such must of necessity fall under the laws governing inorganic matter, therefore fluids are exactly in this state ; but then there is the blood of man and other warm blooded animals the most important of all

fluids, possessed of a high nervous power, I take this as the best example, as in the opinion of Hunter, it is possessed of life, nay some of the present day may even adhere to its *vital* principles ere I conclude the subject of Cholera. If they say that the blood receives life by being acted on by the nervous influence, as it circulates through the whole body,—that in this way, it keeps up, and retains its various properties, I am of their opinions, and these are rendered extremely probable when we take certain diseases into consideration. As to oxygen being the sole agent in the production of the animal temperature, I shall introduce a quotation which may serve to shake such an idea. “ Though oxygen may contribute somewhat to the generation of heat, its chief action is that of serving as a stimulus to the living power in generating it, for it plays an interesting and active part as an exciting power throughout all nature both animate and inanimate, being a main constituent in water and atmospheric air, and indispensable to combustion, and no animal exists without more or less of its influence, either by respiration or otherwise.” In proof that artificial heat has a great and wonderful influence on vegetable and animal life, I wish only to bring forward an instance or two of the latter sort, the chick in ovo, will serve for an illustration. We know that the Egyptians can produce an abundance of chickens by placing the eggs in ovens properly regulated as to temperature ; here, however, if the warmth be either too great, or too little, nothing of the sort would take place. I only give the fact, for I do not mean to investigate the matter further as to whether the eggs are, in the first instance in possession, of a nervous power. Although the idea may be somewhat problematical, I believe that fœtal life, wherever met with, only

requires a due proportion of heat for a time, so as to bring this into active operation,—it then lives by laws peculiarly its own. But this is bordering on another important subject which I do not wish to have any thing to do with, at least for the present. Examples must be familiar to every one of the sun's rays being capable of producing the same effect in other instances—I shall mention two. The eggs of the turtle and alligator, when deposited in the sand by these animals, after remaining some time, are hatched by the heat of the sun. It is thought that enough has now been advanced to prove that the nervous power is the medium through which heat is, in the major degree, generated in the system of man, and that any cause, which disturbs, or destroys the actions of the nerves, will tend also to the destruction of the heat of the body, or any thing in short which deranges their power will, to the same extent, either increase or diminish it—I have shewn also that animals and plants are much acted on by the presence of heat, either as it exists in the atmosphere or as generated by themselves.

I trust that, in proceeding so far with the investigation and illustration of this highly interesting question, I have not overstepped the bounds prescribed. If the above views be admitted, then there is but little doubt that we must have obtained much information concerning the proper treatment of many diseases, which have hitherto baffled all our best directed energies. The application of this subject to Cholera will appear, when it is stated that such will enable us to account for the cold feel of the skin, also for the paralytic affections which we not unfrequently meet with during the progress of some cases of the attack; for we will invariably find that a perfect paralytic body, or member, has always much

less heat than one in health. As to the occurrence of paralysis of some of the muscles in Cholera, as that of an arm, a leg, &c. we need not be astonished, when we consider the violent action of many of the cases, in which we find a gorged state of the veins of the internal parts, or even an effusion of blood somewhere about the cranium, as is found on inspection; hence such occurrences will take place as readily in Cholera, as in cases of apoplexy, concussion of the brain and some other diseases, in which the nervous power is either heavily pressed on, or in which severe lesion has been inflicted on the cerebrum, or medulla spinalis, or, in proportion to the nature of the power applied, whether from a gaseous substance or otherwise, for those may be so potent as at once to destroy their power, either through a part of the extent of the system, or at the very origins themselves. Hence we can easily account for the appearances met with in a Cholera case, such as the eye being fixed and immovable to all external stimuli, as sometimes likewise takes place in concussion, and oftener in compression of the brain, or other diseases; we may have an incapacity for speech, or a very low articulation, an insensibility of the patient to objects around him, a torpidness of the system, after the attack has continued for some time, with many other phenomena that take place during the progress of the complaint. As the nervous power of a part, therefore, is worn out, or oppressed, so, in proportion, will we have an imperfect performance of its actions, this may either manifest itself in particular parts, or in the whole body, since where there is no life, we can expect no action, and, where there is nervous supply, we may expect to meet action in proportion to its energy; when any cause is in existence to call it into operation this may either be a weak state of it, or the re-

verse, for over excitement in a part does not necessarily produce an increase of action, as it may be of the depressing sort, especially in worn out constitutions; over excitement may be said to produce spasm in a healthy stout body, but in one in opposite circumstances we will have a state approaching to paralysis. Having stated the above influence of the nervous system, the next subject for investigation is that of

CHAP. IV.

THE BLOOD AND SECRETIONS.

It is imagined that most medical men, if not all, will admit that a proper digestion, and performance of the respiration are necessary to the maintenance of healthy action in the body; also that, upon the efficient operation of these, the blood depends for its richness and purity. A man with a good digestion, I do not mean a glutton, but one who properly digests what he takes, and in sufficient quantity for the maintenance of his size of body, with a free respiration and good air, will have proper blood, as the product of the conjoint actions. A man who, on the other hand is unfortunately troubled with a bad digestion will have a less rich blood, although his lungs are acting freely and inhaling a pure air. Let any of the accustomed secretions in these men be impaired or stopt, as that from the skin, or the bowels, the bile, or the urine, &c.; under each, or all of these circumstances we will have disease produced, which will equal in extent the cause from which it arises, or will run a course in proportion to the susceptibility of the man for imbibing impressions, or for resisting them. The stopping of any, or all of the secretions, therefore, is sufficient to produce disturbance of action in the general

system, as the blood cannot so readily get rid of the impurities which it has contracted from going the rounds of the body. Hence it also follows, that the longer the duration of this disturbed action, the more likely are we to have disease of some nature or other induced. In illustration of the above it may be proper to state that the blood, in its visits to the different parts imbibes from them impurities, which are got rid of through the process of respiration, &c. ; but if the air be bad, or the accustomed evacuations checked, we have one, two, or many causes operating towards the production of disease, which may even occur to the extent of the exciting cause or causes, whether as existing in the blood, from its not being able to free itself so readily from these impurities, or as arising from other sources.

When we observe all the secretions checked in any disease, as happens to be the case in Cholera, the patient must soon die, did this proceed from no other cause than the excess of what has been called azotic particles in the blood, or the other ingredients collected in it from the various compages of the body ; thus it may be said that man generates a poison capable of destroying himself, and that speedily, if not removed by the re-establishment of the various secretions. We see, then, of how much importance it is to keep these free, and properly regulated. Under the circumstances of one very important secretion being checked, the lungs, in co-operation with the other emunctories, may be unable to throw out the excess of impurities, even in the most pure air,—that they may do so under certain states may be true, but, if few grant that the lungs are only for the purpose of purifying the blood to people in health, it surely is not to be expected that they can do more than this, when the other secreting apparatus is affected by disease. and

thereby rendered incapable of throwing off the onus of one, two, or three important and extensive secretions, which are now supposed to be impaired, or totally checked. The blood, therefore, being rendered impure, in a major or minor degree, from these causes, will still have such impurities going on increasing; these, when accumulated, as accumulate they will, must tend strongly to the general disturbance of the balance of healthy action. We thus see the great importance of paying strict attention to all the secretions. A checked perspiration gives rise to headaches, fevers, bowel complaints &c. and the reason of these occurrences may be explained on the principle of a sympathy of communication. When the secretions of the urine are impaired we have much excitement produced; this sooner or later ends in fever. The bile being deficient in quantity, or obstructed or vitiated, gives rise to inflammation of the bowels at times, or to serious disturbance of the whole powers of the body, and a suspended secretion of the fæces may also occasion an inflammation in the alimentary canal, the liver, or even fever with many other diseases. There are many other complaints that have their origin in these several causes, which it is unnecessary to state here, my only wish being, for the present, to draw our attention to these facts, in order to point out the vast importance of attending to their proper regulation.

I do not intend to dive into their several causes, or the manner in which such may operate on the system; by referring to what has been said, on the sympathetic actions much may be learnt; I at present, therefore, observe, as a well known deduction in medicine, that it is not one secretion we must endeavour to restore in disease, but all, and this too by a combination of remedies adapted to fulfil many such indications at one and the same time. Thus calomel and opium in combination —

antimony and calomel, or this last, with a purgative, will accomplish many of these intentions, and in this manner we may speedily relieve our patients at the very commencement of disease. I cannot say in every instance, for there are many points to be taken into consideration in the treatment, such as the duration of the attack, since its nature may be of an ephemerical sort, or may be determined to this by our remedies, or the disease may be such as to run its fatal career in the space of a few hours; in such instances we must employ more energetic measures, adapted to the nature of the case; thus in Cholera, in many cases, we would waste much valuable time by having recourse to a *dilly dallying* sort of treatment, for this is a disease, when of the more aggravated form, in which the axe must at once be applied to the root of the evil, and our best endeavours must be directed to prevent the occurrence of symptoms, or if present, to effect their speedy subduction. When there has been disease existing for some time we will find that there is some secretion not in proper play, we may also perceive that it cannot be restored at once, and that we must proceed slowly and cautiously to work, acting gradatim on the general system by some remedy, or a combination of such as may be capable of fulfilling the object in view. An example amongst the many that could be adduced may be given in that of diabetes mellitus, in which we will find the secretion of the skin as well as that of the bowels, in general vastly deficient, and acting capriciously, with many other attendant circumstances. Now we cannot operate in these cases at once, perhaps, by the exhibition of Dovers powder so as to bring back the perspiration; but this may be accomplished in time, by a proper plan of procedure. So also in ulceration of the bowels, we may not be able to remove the pain in some

cases by the exhibition of opium, but we may lull it for the time being, this, however, will only be for a time. We know well that mental depressions act as a sedative to the whole of the animal and vital powers, suspending, in a greater or less degree, various secretions of the body, such as the bile or perspiration, and, if of long duration, they will to a certainty produce disease, which in its turn may react on the brain, and this again on the general system. In such cases we may do much good by a discriminating administration of medicines, but the only effectual remedy is a relief from the mental despondency, joined to pure air, good diet, and as much exercise as the patient may be capable of sustaining—provided he keeps within due bounds.

From suppressed secretions, then, we may have diseases as diversified as the characters of mankind in general, these it would be worse than useless for me to enlarge upon, suffice it to say, that whatever produces nervous derangement will to a certainty cause disease, in proportion to the excitement, and whatever produces a stoppage of the secretions will as certainly produce disease, either primarily in the parts, or secondarily in the general system, through the influence of the nervous power, as I shall have frequent occasion to shew in this Essay.

Is it not likely that when we meet with a slow circulation, in any disease, that the blood takes up and contains a greater proportion of noxious particles, that also in proportion to its slow movements, and being shut up in the body, it will tend to the overthrow of the nervous power; for I look on the blood as one of the main stimulants to the *general* and *local* nervous power; hence we may easily imagine the extent of the evil that will result from the extensively obstructed secretions, which we meet with in

more diseases than the one immediately under our notice. The parts that are destined to be nourished with pure blood will be thus impaired in their action, as no one part of the system lives by its own laws, but by those that govern the whole of the animal machine, so a part once attacked by disease will gradually draw in those in its vicinity, and so on until the whole system is under its influence. Therefore, what is to prevent this very cause from acting as readily on the lungs themselves as on any other part of the system, and in this way producing a disturbed respiration, as we see particularly marked in the latter stages of severe cases of cholera?—or what is to prevent this same cause of impure blood from producing an extraordinary action of the heart, and affecting the nerves, not only of this organ, but of the general system so as to induce a more rapid dilatation and contraction of the heart and lungs? This is not all, the circulation becomes torpid in the larger vessels, and at times so much so indeed, as to all appearance to stagnate there, so that really there is but little going the rounds of the circulation, notwithstanding the hurried respiration and quickness of the pulse. The lungs, being in over action, will of course allow less time for the purification of the blood, and although some might be inclined to imagine that in proportion to its quickness of circulation, in consequence of the now hurried respiration, so should the vital fluid be in an equal degree purified, since more must go through the system and thus make up the difference between its comparatively slow movements in health. The blood, however, in the former instance has not time to throw off its impurities in consequence of being quickly sent the rounds of the system; and, as we will find in the generality of such cases, previously healthy, there is always a tendency to a venous con-

gestion, therefore less blood is now actually in circulation than would otherwise be the case; this cause therefore, increasing, at length breaks forth in the general system, and produces serious disturbance and numerous diseases,—these existing in degree according to the susceptibility of the patient, or the resisting power of his nervous system. Do not, however, let us be deceived as to the quickness, or hurried manner, in which the lungs and heart play their different parts, and imagine that the blood is better purified under these circumstances,—no such thing will ever take place, these two functions are now not in their natural state, hence it follows that, in proportion to the distance the blood is removed from them, so does it collect the amount of the disturbance. If the blood could be better purified by the combined operation of the causes just supposed, we surely would have found in the generality of mankind such a state existing—but no—the blood, under these circumstances, is forced on without being allowed proper time for the purification, and this in *small* quantities, hence an accumulation of atoms of noxious properties, hence also proceeds an irritability of the heart itself, or of the general system, or of the nerves of the different parts. Do not imagine by irritability that I mean an increase of one or all of the functions of the body,—that is not exactly the full extent of the term applicable here, for we may also have a weak state of the organs induced from the same cause, but less in degree and they may be in a state just approaching to, but not actually in an irritable condition.

What are we to do in such cases, as at first supposed, with respect to the increased action of the lungs and heart, are we to abstract blood or not? The former of these propositions certainly seems the more proper plan of procedure, but what is to be gained by it? We will cer-

tainly subdue these actions in many cases, but in others we cannot do this, although we may moderate them, hence an amelioration of symptoms, but the present existing cause, or that arising from checked secretions, or rather powers, operating on the system, being only in part, and this too, for the time being, subdued, does not necessarily take away the whole extent of the original cause which is now present in the general system ; therefore this being in duration will or may go on to increase, notwithstanding the now lessened quantity, and perhaps partially altered character of the blood. The nerves of the part may have been previously thrown into an unusual state ; they may have taken on diseased action, and this, either sooner or later, according to the peculiar condition of the body for resisting or receiving impressions of this nature. Now this may be all caused by our tardiness in having recourse to venesection, or it may take place from abstracting too much blood, or from the already impaired powers of the system. I therefore, infer, that it is an important point to bleed *early* in such disorders. The term *early*, be it recollected I mean to apply to those cases only in which there is sufficient action in the system to warrant our interference. The above, however, may arise from a tardiness, or unwillingness, on the part of the patients in making their appearance for advice. They, therefore, must be to blame for any of the evils which result from a protracted case—such as inflammation of an organ that has occurred, in consequence of their late application, for now all that we can do is to *moderate* the action, we cannot cut it off entirely, or we may place the part at the balancing point of returning health, or inveterate disease. This is no idle speculation, we therefore require to be on the alert, when we take lancet in hand, to use it with strict attention to ex-

isting Circumstances. I defer at present entering any further into this point, when, however, the treatment of cholera comes under review then will be the time to state distinctly under what circumstances, we can safely and effectually put this remedy into full force.

What is the state of the blood in Cholera? By referring to the experiments of Dr. Davy, as given at page 13, it will be found that it is much altered, being greatly deprived of its oxygen, and having in its place an accumulation of azotic, or other noxious particles, so that it is almost impossible to distinguish between the venous and arterial. I have seen cases in which this would have defied any one,—even the most strict investigator. Why should the circulating blood be so uncoagulable as we find it to be? Does this not lead us irresistibly to the conclusion that there is a loss of something, which will afterwards appear to be the nervous power; the loss of this destroys the properties of the blood, and, as it were actually *dissolves* it—the more fluid particles having by some means or other escaped, since we in general, especially in the most severe forms of the disease, find nothing but black thick blood remaining. That the fluid particles are not diffused in the muscular parts will at once appear from the consideration that every part of the body is shrunk or shrivelled, and the intestines in many places are often found contracted; but we do not find in the substance of these parts many watery particles, as is evinced on dissection. The blood of Cholera patients, particularly in the more advanced stages of the disease, when it can be drawn, is excessively dark, does not readily coagulate, or in other instances in which the disease has fully formed, it is also certainly much altered as to colour;—does this not shew distinctly that the lungs have not the power of purifying the blood,

in consequence of a loss of tone? Whether this takes place from an impaired action in the lungs, or from the deficit of the nervous power (which I shall afterwards show to be the case) need not stop us at present in our inquiry, but we may do well to imagine that such occurs from the combination of both, and that this rapid change induced shews an evident want of serum in the blood itself, which may appear satisfactory to those who have seen inspections of Cholera cases, or even from the blood, when obtained in the more advanced stages of the disease. The blood, when drawn from a vein, has been observed not to coagulate at all, and even the serum, which is at times *long* in separating in the less severe forms, has been observed as “white as milk floating on the surface.” As to blood becoming putrid or dissolved in the progress of fevers; Dr. Cullen observes “from the dissolved state of the blood as it presents itself when drawn out of the veins, or as it appears from the red blood being disposed to be effused, and run off by various outlets and from several other symptoms, to be hereafter mentioned, I have no doubt, how much soever it has been disputed by some ingenious men, that a putrescency of the fluids to a certain degree, does really take place in many cases of fever.” That a putrescency is not produced in the blood in this disease, may appear from the shortness of the duration of some of the attacks; I, however, contend for a dissolved or, more properly, an altered state of the blood, in consequence of its having lost that vitality which the nerves seem capable of imparting to it. It will now be more easily divisible into its different constituent parts, which we observe takes place so readily on its abstraction from the body, particularly in those instances of disease in which the conservative principle has been much drawn

on, or nearly expended during life, and is, at the time, in a very low state. It is surely no very great outrage against the opinions of physiologists to suppose that the blood is just as much *alive* as any other part of the body, at all events it seems as much acted on by the nervous power, from its making the rounds of the circulation ; from that power also, it receives its vitality, in proportion to its wants, much in the same manner as the other portions of the system. Therefore from a deprivation of the nervous influence, as well as from the noxious particles imbibed, the blood is destroyed, and the latter contribute greatly to the diminution of the powers of the former. We are all perfectly aware that the milk of the higher classes of mammalia loses many of its properties when long out of the body, and that it is then by no means so nutritious to the young of these classes, even although it be of the same temperature as when drawn from the teats of the parent ;—being deprived of the influence of that all powerful principle which contributes in a high degree to the heat of the frame, it is very soon robbed of many of those important, and seemingly volatile principles which it possessed, when in the body. The atmosphere, therefore, is capable of producing most important changes on the blood, even as it exists in the system, as well as on some of the other secretions. But in the body there is this difference that, so long as life remains, there is a degree of nervous action commensurate with the existing vitality. What relative change this diminution may produce on the state of the blood we cannot distinctly state, but we know that, in all cases of disease, with a decrease of this action, the blood is thinner and more liable, on being withdrawn, to run into an altered or, at other times, to a putrid state. It is perhaps wrong to

imagine, although I am strongly of the opinion, that the less nervous power there is, the less rich will be the blood, and that, in this way, we may have it going down the scale of existence. We cannot perhaps, from analogy, draw the same inference between the fluids and solids of the body, for in the former we see different changes taking place in various organs, not according to their apparent degree of vitality, but according to the difference of change the nerves supplying them are capable of imparting; under these different forms of life, each, although something analogous as to its mode of nourishment, yet differs essentially in its various properties. Such may be the case with the blood, and according to the degree of power in the system (provided we do not go too far else we have disease induced) so will the blood be affected, we do not know what are the different properties of blood, as exhibited under this or that state of vitality, which in appearance exists. May the nervous power not act on the blood in somewhat the same manner that galvanism influences the whole of the body, or the part to which the wire is applied; we then see a convulsion of the parts supplied from the nerve which has been touched. The nervous power may even in this way act on the body, so as to be one, or perhaps the principal means, by which the blood is altered or dissolved, in the same manner as a metal is melted by the application of the conducting wire of an electrifying machine. This is rather a curious notion, but I do not think it will be found far from the truth, since the mere abstraction of the nervous power from the blood, may allow such an occurrence. From what source other than the blood can those amazing quantities of fluids be derived which are poured into the alimentary canal often in an incredibly short time?—these are so quickly supplied,

in many instances, as to preclude all idea of their being a secretion,—even admitting that they were, still they must come from the blood, and from its more fluid parts. We see a similarly abundant supply arise from other diseases as well as Cholera :—as on the re-action of the system in some cases of epilepsy, and other sudden states of excitement, and also in a diminution or derangement of the nervous power at its origin and extremities. It would be in vain to expect this occurrence in every case, since man is so diversified in constitution, and other points, that what materially affects one will make no impression on another, although apparently under the same circumstances.

The heart being a muscular organ is capable of being acted on as the other muscles, but it has a larger provision for the maintenance of its incessant action than they. this consists in the greater supply of nervous power, great care being taken, on the part of the system, that this organ should be kept in as uniform motion as is compatible with the existence of the person, but from this cause it is more apt to be affected by the various passions of the mind, or the impaired secretions which act, as already stated, as a general cause of disturbance to the whole nervous system. This large supply of nervous power, with which the heart is endowed, will as a matter of course then, when oppressed by disease of long continuance, or other causes, be more severely felt, and will be put in order with more difficulty than the deranged action of any other muscular organ ; hence the great difficulty we experience in the treatment of diseases of the heart. I believe, with Cullen, that the action of the heart depends in a great measure upon the healthy condition of the brain and nerves, and that it is from this quarter, at all events, that it derives much of its power, as well as perhaps from the stimulus of the arterial blood with that of the ve-

nous. "I must assume a proposition I suppose to be
 "fully established in physiology. It is this, that though
 "the muscular fibres of the heart be endowed with a
 "certain degree of inherent power, they are still, for such
 "action as is necessary to the motion of the blood, very
 "constantly dependent upon a nervous power sent to
 "them from the brain." Hence any cause of sufficient
 power, operating primarily on the brain, will tend to dis-
 turb the action of the heart. It has been stated that
 venous blood is sufficient to maintain the action of the
 heart, keeping it in play for some time, this may appear
 evident enough when we see it occur in those cases in
 which the foramen ovale remains open up to and after
 the period of adult life. But what is the case here, we
 see that the blood is never properly purified, besides, there
 is always a proportion of arterial blood, at least so much
 as to maintain vitality, but this in a minor degree compar-
 ed with what it would be, if no communication existed,
 venous blood purely so, I say is not able to maintain the
 bodily powers in a perfect state, and that this must prove
 detrimental to the general system, in proportion to the
 quantity circulated. If it were otherwise we should have
 had but little need for that great provision which is made,
 and this carefully for the circulation of pure and unconta-
 minated blood. But that venous blood should keep up the
 action of the heart, for a time, need not surprise us, when
 we consider that such blood must be possessed of a vast
 proportion of that stimulus of the arterial. That the re-
 al and true blood, however, is not manufactured solely be-
 tween the lungs and heart may appear somewhat evident,
 when we see the chyle circulating in the system, thus it
 may, at times, proceed above once or twice through the
 body, ere it be properly assimilated. I imagine that it
 requires to do this in order to be brought under the ope-

ration of a greater extent of the nerves, and that this is requisite in order to its conversion into true or pure blood; the nerves I say have a greater power in converting the chyle into blood than is usually assigned them, and I think this fluid must go the rounds of the circulation ere it can be properly said to have got under the influence of this power. The state of the circulation, in the disease under our immediate consideration, will be easily accounted for, by allowing each power engaged in this to have its due share in the disturbance; now we can easily perceive the reason why such a variety is to be met with in those patients as respects the state of their pulse, as well as the sudden disappearance of the same, which, in some cases, may be as instantaneous as that produced by a shock of lightning acting on the system, and that the pulse or the action of the head will be found to vary according to the resisting powers of the body. What are the secretions that are suspended in Cholera? We have *all* the secretions in such a state, or they are certainly in a much disturbed condition, as that of the urine, the bile, and others. But then I say that these are not the *cause*, but the *effect* of some other operating power producing the disease. The secretion of the skin is not natural, I do not mean as regards quantity, but I think that it is in a much altered state, and comes almost in a *direct* manner from the blood itself. I think that the vessels of a secreting part have the power of selecting, from the blood, what is proper for the healthy performance of their action, who can tell the change that may be produced in such when labouring under an oppressed cause, and it is imagined that in this disease the epicurean property of pleasing their palates, if the expression be allowed, is lost, and that the blood parts with its more fluid particles, which may un-

dergo but little, if any change, in passing through the vessels of the skin, and this also holds good as regards the vessels of the intestines, but this point will be illustrated more fully in another part of the essay: I at present only state that these increased discharges, with the suppression of others, are not the cause of the disease, but are produced in consequence of an all powerful one acting generally throughout the system. I will hereafter attempt to dive a little further into the mysterious workings of the animal economy, in the prosecution of which, it is to be hoped, that the light which guides me, may shine as bright as it seems to have done to others in their investigations of the other phenomena of the animal machine, which also seem to be disturbed by this phantastic disease. The *whole* arcana of the animal body are, it is feared, beyond our exploring, since the real acts of the human machinery enclosed in that small space called man have not been clearly ascertained, even from the time of his first creation to the present day. When the *box* is opened who can help admiring the wonders that are presented to view, and the various combined operations produced from their proper play; but the great architect or disposer of all these things, keeps many of them hid from our scrutiny, and seems to say you may only explain the tangible material, as for the mind or soul that I will not give. Under such a view of the subject the task as has been already hinted may be hopeless, it is, however, to be believed, not entirely useless, and, in the mean time, I will go on to our task by enquiring into the subject of.

CHAP. V.

C H A P. V.

THE BRAIN AND NERVOUS SYSTEM.

Many are of opinion that various poisons, and miasmata, in their primary actions, have decidedly a sedative effect on the nervous system; such was the idea of the celebrated Cullen, and others even of the present day. But we do not, in all cases, observe this to be the result it is therefore believed that miasm, or any other cause of a similar nature, is equally capable of producing a stimulant, as a sedative effect when first imbibed by the system; and it may properly enough be viewed in its operation, just like opium, according to the extent of the dose, hence we have its more immediate effects of a stimulating and these followed more quickly by others of a sedative nature, this too in proportion to the quantum of the drug administered, or imbibed by the system. So in like manner, we may view the action of miasm on the human frame; for do we not find, at the *commencement* of a great many attacks of Cholera, that the brain and nervous system, so far from being *diminished*, are actually increased in their actions; this also takes place in many cases of fevers which owe their existence to the cause under consideration. Do we not find that, in some instances, from the very first, the whole actions of the system are above par, as evinced by the bounding pulse in high states of Batavian fever,—the additional extrication of animal heat,—the flushed face severe headache, or even delirium and other signs which clearly demonstrate an increase of action; these too, occurring before the system begins to react, for in other cases, and these the majority perhaps, the body is first oppressed, it then conquers such a state, but, in the attempt,

reaction attended by the above symptoms is produced. H. M. S. *Imogene* while lying at Batavia in September 1833, had a few cases of the local fever; there was one of these in which delirium was one of the earliest symptoms. The patient who had, previously to the attack, been in good health, without any complaint of languor, lassitude or the other usual signs of fever, was assailed, a very short time after dinner, and, as has been stated, had high excitement from the beginning. That these states of body may soon fall, or be brought under par, is apparent enough to those who have paid any attention to the subject. The reduction, therefore, of the stimulus, by which the nervous power is at first assailed, causes these appearances to diminish, and this is to be accomplished by the abstraction of blood, and by other subsidiary measures, at the very onset; hence we can only account for an increase of these actions from the very first, on the principle of stimulation; for such conditions of the body, I should think, cannot be satisfactorily explained on the supposition that there is a low action primarily produced, and before reaction has commenced since we find no sedative that is capable of producing it, without previously causing an excited state in the system, which may continue for an indefinite time according to circumstances;—there is certainly, one substance an exception to this remark, and its prussic acid. The subduction therefore of one stimulus, of such a power as that affecting the nerves, would not directly, or even indirectly, account for an increase of action in the other organs, unless under particular circumstances, in which perhaps the former or latter had been previously too much oppressed; but then the withdrawing of the oppressing power would only *regulate* this action, and might allow the more free action of the heart and arteries; such as some-

fimes occurs when we bleed in peritoneal inflammation, in which we see that the subduction of a too powerful cause, or that from bulk alone, is sufficient to give an equilibrium to the powers of the body, by allowing the various functions to return to their proper state—at all events to approach to their natural condition. In such a case then, we may have the system either acted on more forcibly, or apt to be depressed, according to a multiplicity of causes, all depending on the brain and nervous system. There can be but little doubt that, by diminishing the energy of the brain, we will find in proportion to this, and to the extent it suffers, in the majority of cases, a depressing influence extended to every part of the system that depends more immediately on it for its supply, and that this will be attended by many of the appearances which we observe in those who have been long harrassed by severe mental afflictions, in whom, we may believe, the brain is in a very disturbed state, and that a slight disorganization may even in this manner be produced.

But I cannot admit, as above stated, that this abstraction of power, or debility produced in the nervous system, can be the cause of an increased and violent state of the circulation. No doubt we will find in many cases, that the heart and arteries are not acting properly, this, however, is to be ascribed to an irritable, not to a debilitated condition of the nerves. For we may overcome this particular state by any power capable of *soothing* them,—as by the administration of opium, if this medicine be adapted to the purposes which we have to fulfil, we will then find that the circulation proceeds in a tolerably regular manner, and this too from the exhibition of the sedative ; for the heart and vessels only begin to act well when this power comes into full operation,

so that, had the primary impression been that of a sedative power, we ought now, by the administration of a second, to have had an increase of the oppressing symptoms. This shews evidently that it was not dependent on the cause alleged by others viz, that miasm has at all times, at first, a sedative operation, since we observe that the sedative powers of opium completely regulate the action. There are many other medicines capable of producing a similar result,—amongst the rest are tonics; these, however are more properly used towards the termination of such diseases; for, by giving strength to the body, they add firmness to the nervous system, and thus, by removing its irritable condition, as well as the general debility, place it in circumstances favourable to its return to a healthy state. Dr. Cullen says “this debility proves an indirect stimulus to the sanguiferous system; whence by the intervention of the cold stage, and spasm connected with it, the action of the heart and larger arteries is increased, and continues so, till it has had the effect of restoring the energy of the brain, of extending this energy to the extreme vessels, of restoring therefore their action, and thereby especially overcoming the spasm affecting them; upon the removing of which, the excretion of sweat and other marks of the relaxations of the excretories take place.” Here then, I believe, will be found not only an increase of action, but this also occurring from a sedative effect produced on the nervous power. It is thought that the Doctor is somewhat out in accounting for the first of these phenomena,—that of the increased impetus of blood, since the action of the heart of itself, even with the stimulus afforded by the blood, cannot well do this, we have only to turn our attention to that action and ask why it does not continue in excess, now that it

is once set agoing ?—is it not much more to the point to suppose that the regulating power of the nerves, the parts chiefly assailed from the first, and the increase of impetus to the circulation, occur in consequence of the sensorium commune *struggling* to get rid of an *oppressing* cause ? In such instances it may be said that no sedative effect is produced, and that the heart beats quicker on account of the irregular impressions communicated to it, by means of its very large nervous supply ; this, however, may be allayed by various medicines, or may cease from an exhaustion of the exciting cause, when the other parts and functions will regain their healthy condition. The reason why these paroxysms may occur in succession, or at regular and fixed periods, is not so evident, the changes which are produced on the human frame under these circumstances, are indeed difficult to be accounted for. That such do not occur, in consequence of the deranged state of the circulation, may at once appear when we consider that there are always some febrile symptoms before we have any marked effect on the pulse ; we may thence safely conclude that the nerves, like the main spring of a watch, constitute the *regulating* power of the whole animal machine.

To illustrate the great and commanding influence of the nervous power over the functions of the body, it will be only necessary to notice the effect of galvanism or electricity on an animal in which life has become lately extinct but which still possesses a considerable portion of its natural heat. I have seen criminals, shortly after execution, subjected to this power. When the conductor was applied to the exposed nerve, the whole of the muscular power, supplied from this source, was greatly convulsed, and in proportion, as the body became colder, or lost its natural heat, the more feebly were

the parts acted on. The contortions and convulsions exhibited in such cases are well known to those who have witnessed similar experiments. Now some may be apt to say that this is dependent on a *sedative* power, or on debility in the nervous system ; this may be *one* cause, but it is assuredly not the *first* in the action ;—can the galvanism or electricity as above stated act as a sedative in the first instance ?—I should think not, and therefore an improper quantity of stimulus transmitted along the nervous cords will be as likely to cause this, as the opposite state, in which the action is said to consist, hence then we may have two causes operating as the source of convulsive action, and each may come into play in its turn,—and this so quickly that there will be a very slight interval between them. Both these states, I conceive, are produced by the operation of marsh miasm in a certain degree of concentration ; they also occur in Cholera, and are even met with in succession in the same case in many instances. Now the miasm, or that power operating on the nervous system is not, in all cases, of a sedative nature, on the contrary, it is imagined, that at times it proves highly stimulant from the very first, or that it acts in a manner similar to opium. When the powers of the system, therefore, are great, the operating cause not being such as to overcome it at once, we will have the more severe muscular or spasmodic affections ; and, strange as it may appear, a case in which these have been in existence for a considerable time may be a good and successful one for treatment. But when these are in a weak state, the spasmodic affections low, or not very severe, then we have the sedative state in being, and the system unfavourable for treatment, provided the patient is weak and the disease is attended with the usual vomiting and purging. We can, therefore, easily see the reason

why, if the disease be not checked in the more aggravated form, it may speedily assume the more mild spasmodic actions, and also why the one stage may rapidly succeed the other. This, however, be it recollected, is not the usual manner in which we meet with Cholera cases ; but those in which we find high excitement, with severe spasmodic actions, may in general be preserved by a proper treatment. Hence also we may conclude that an almost total absence of this power will be attended with the greatest danger, for we cannot in general expect that life should long continue in such cases, since all that could be added to the power of the nervous system, either by galvanism or electricity, must only exhaust it the quicker, since we cannot keep up the natural action without restoring the respiration, and the circulation of pure blood. this we must find the only sure, and true power, that is capable of acting on the nervous system. It is, therefore, to the establishing of such actions that we should particularly direct our remedial measures, for without this little or nothing can be done. In those instances which are much oppressed by the disease, in which all spasms have ceased, or been but slightly in operation, and which fortunately have reaction set agoing, we at times perceive an attempt at the renewal of the spasmodic affections, this, however, is prevented from coming into full play in consequence of the nerves being either too strong to resist the tendency, or, what is more probable too weak to take on the action.

From what has been advanced regarding the brain and nervous system, when operated on by certain noxious substances, the following inferences may be drawn, viz;--- that they produce various effects on the body, according to certain states of it, with other things to be taken into

account,—as the quantum of their application,—the length of time the person may have been exposed,—the susceptibility of the patient, as well as the time they have been in the body,—the climate,—the usual diet,—the state of the weather, whether our patient be young or old,—whether he has been long in a hot-climate, &c. I may say that I view all fevers arising from marsh miasm, or the effluvia produced from such, and other sources to be met with in hot climates, to be of one and the same sort, only modified by the climate, the age, and other circumstances stated ;—occur in whatever portion of the globe they may, they all operate on the nervous power of the body, in one of the three following ways. Viz.

1st. The miasm imbibed is capable of producing a stimulant action at first, according to the state of the patient, &c. This is to be inferred from the production of actions like those which follow the administration, and full operation, of other strong stimulants—such as alcohol. These may continue for a time, if not interfered with, or until our patient is either lost from the excess of stimulation, or until the effects of the action wear off, as in the case of other stimuli before the operation is completely overcome; we have then a sedative effect produced, in which we may find much difficulty to arouse the system, merely from the circumstance that the former operation has reduced it to a very low state,—it may approach near to the very point of annihilation. Now the proper treatment in all such instances at the very onset is to bleed not only early, but to the extent sufficient to curb this action, no matter whether this requires one pound, or three, to be at once abstracted, for, be it recollected, I do not mean that any one should merely go through the *form* of blood-letting,

care should also be observed. However, that we do not go to the other extreme, our object should be to abstract so much blood as may be necessary to produce a proper regulation of the nervous powers, as well as of the other actions in the system. The next remedy ought to be large doses of calomel: be it recollected we are speaking of hot climates: these repeated three or four times during the first twenty-four hours will soothe the nervous irritation, at the same time that we act on the various excretories, in order to restore the impeded or checked secretions. At night we may join to the calomel ten to twenty grains of Dover's powder.

2d. The second effect produced, from inhibiting the motion, is that which we most frequently meet with, viz. a sedative effect, as is evinced by the languor and lassitude, drowsiness, headache, and (with reaction about to commence,) gastric derangement, with many others so well known as to require no illustration. If nothing is done during this period, we will find that the system does not stand still, for we will soon perceive that there is pain or tenderness in some of the larger organs, such as those of the liver, brain, stomach, bowels, &c.: now, at this time, any of these parts being so influenced, will *react* on the general system, from which we may have a train of very formidable symptoms, according to the extent to which the exciting cause, as it exists in the nervous power, may form a nidus for its own irritation in these parts,—which I regard as the primarily disturbed and also the principal power involved and that which now keeps up the action. This may also arise from the altered state of the viscus, which serves as a continual focus for excitement: thus we will have the brain and nerves acting primarily on these parts, in

consequence of the exposure to the miasm, and secondly they may again act on the body and produce a general disease, and in this way the whole powers of the body are in full play against the organ first attacked,—thus too, the disease will be present until these powers are expended. The treatment in such cases, at the very first, is to bleed ; but this is only to be done when we have action sufficient to warrant our interference, when so, we must bleed to the extent required, and as soon as possible thereafter administer large doses of calomel ; and this last even when we cannot bleed, with the same chance of doing good, thus we may prevent that state of high excitement about to take place, and that tendency to inflammation of any particular viscus, so apt to be induced, if we did not subdue the nervous irritation. If the emunctories were not speedily opened by the calomel, and other remedies in combination, the cause continuing, notwithstanding the bleeding, would only again be brought into operation, when the system recovered somewhat from the depressing effects of this remedy, and would be placed under very unfavourable circumstances, since perchance we could bleed no longer, or the disease might be fully formed, hence the great importance and necessity of attending strictly to the proper application of these most valuable remedies.

3d. This state, as induced from the operation of miasm on the nervous system, consists in an intermediate action between the other two, in which it is, as it were, vacillating, or hesitating to which side it should give the preference,—whether to the decreased action, or that of stimulation. Nature does not allow this long to continue, for the partition, dividing it between the two others, is so diaphenous as, at times, to be difficult to determine which side the disease will turn to, so that what serves

for the base of the one action, will be the apex of the other, and each, when once set a-going, may proceed to extremes. Now those men who are most liable to this state of things are the *apparently* stout and healthy, who have been much addicted to various excesses and who have been thereby rendered peculiarly liable to its influence ; we will find that it is rather a difficult matter to manage them as decidedly as in the two former instances. Fortunately we are not long left in suspense, since our best practice will be to combat present symptoms; provided we cannot bleed fully and freely, and thus moderate or support the action according to circumstances, we may do so to the extent required. Under all circumstances however, when it is possible to give calomel, we should do so from the very first. I have entered perhaps a little too far into this subject, but its importance may plead some palliation, since it shews the commanding influence which blood-letting and calomel have, when properly had recourse to, in the reduction of the general and local excitement of the nervous system.

In conclusion, I shall merely advert to another point to shew the extent of the nervous influence, as exemplified in various compartments of the body. It may be only necessary to adduce, as an instance of this, the state of the bladder as it is often met with in Cholera. It is astonishing to what a small bulk we may have it contracted, for we may meet with it much smaller than an egg. Does it not follow that the abstraction of the nervous power *suddenly*, and before the stimulus it excites in the part is entirely expended, or dies away, is the cause of our meeting with this contracted state of the bladder ? This power may be quickly abstracted or deadened in the main branches, and may leave the smaller to expend the whole of their energy ; hence we

observe the great contraction of the muscular fibres. We know well that such an occurrence takes place in many animals when killed for the shambles. In such instances we find their urinary bladders contracted to a very small compass, and this may certainly occur from the sudden abstraction of the chief part of their nervous power, which induces a species of paralytic action in the main trunks ; or the stimulation left from such a cause as the cessation of action of the direct nervous supply may do this, which will now be in some measure assisted by a reduction of temperature, arising from the absence of a great proportion of the former natural heat of the part ; these two causes may contribute greatly to produce the effect mentioned. In such cases then, we see no inflammation of the system or part, for we meet with no apparent disease, but that of a very rapid sinking of the whole of the animal and vital powers. Before I state, in a full manner, the operation of the nervous system in this disease it will be proper to examine the subject of

CHAP. VI.

MARSH MIASM.

Under this head I will take into consideration most of the phenomena that occur either from this, as a cause of Cholera, or from a deteriorated state of the atmosphere, when the body has been exposed to its influence, as also some other general points connected with the disease. The remote cause of cholera, as well as of many other epidemics, whether happening more rarely in Europe, or so commonly in India, of whatever importance to be known, is as yet involved in the greatest obscurity. Diffident as I am on this point, the following appears to me

to approach somewhat near the truth; and the longer I have considered this most important and interesting subject the more satisfied have I become of the correctness of the opinion, that the disease depends, in some degree, on a particular state of the atmosphere. This I will afterwards attempt to prove, with the admission however, that the proof to be adduced will, from the obscurity of the subject, fall greatly short of demonstration. That there are many poisons carried about, and widely diffused in the atmosphere is perhaps not generally admitted; it nevertheless may be true; if so, what is to prevent marsh miasm, or any other gaseous, or poisonous substance from acting in a deliterious manner on the system generally, and thereby producing this disease as certainly as it does intermitting and remitting fevers?—My opponents will say that these disorders occur entirely out of the reach of any sort of miasm, and when, in fact, such has never been present. I know, and admit this, but not to the extent they could wish. I ask them what is to prevent these morbid ærial substances from being carried about in the air, for many thousand miles,—this too in direct opposition to the prevailing winds? My answer is that nothing can prevent it from taking place. These gentlemen must be informed, that when one wind is blowing over the surface of the waters, or over the land, we have a counter current in the higher regions of the atmosphere, as must be well known to those who have acquired the first elements of meteorology; and may be readily ascertained from the slightest observation of the different directions of the passing clouds. To put this subject to personal proof, it is well known that at the top of Cape Teneriffe the wind is blowing in direct opposition to that which is cooling the inhabitants below. The circumstance of

smoke ascending and mixing with the air shews something else, which shall be noticed very soon, as well as the reason why the land breezes of many parts of our Indian territories are so unhealthy, and the sea winds so refreshing. How did it happen that volcanic dust, when thrown into the air by an eruption, found its way for more than a hundred miles, in *direct* opposition to the trade wind, when it fell on another Island; the following may be adduced as a second instance of a similar kind—It was noted “ as a remarkable occurrence that on the 14th
 “ March the light showers that fell in some parts of
 “ the Island of Malta brought down a reddish earth
 “ with them and on the 21st of March, Mr. Corner
 “ makes this memorandum, ‘ I was this day informed
 “ by the officers of His Majesty’s Ship *Sparrow-*
 “ *hawk*, that, at Palermo on the 14th Instant, the weather
 “ had the same heavy, dull, foggy appearance which was
 “ remarked here, and that a quantity of muddy earthy
 “ substance fell with the rain, but in greater quantity than
 “ at Malta.” These are two distinct points then, that the air at times can, and does contain foreign substances, and also carries them about in the manner stated. Additional facts of this nature might be given, but they would only swell these remarks to an unnecessary length. I trust that the instances which have been advanced are sufficient to convince those who can think for themselves, or even the sceptical, on the subject. Having briefly stated the premises, let us follow the subject a little further, in a general way, before we come to points of illustration; and let me ask what is to prevent the effluvia or other deleterious particles, produced by stagnant pools and marshy grounds, from ascending and mixing with the air—as occurs in the case of smoke? and, when so mixed, what obstacle is there to prevent their being wafted to some distant Is-

land or continent and when let loose with the rain, vapours, or dews at night, &c. to their proving an exciting cause of disease, such as intermitting fever, &c. I believe that there is but little that can be offered as to atmospheric air at all times neutralizing the miasm or other poisonous particles which may be floating in it. This much we know that when they emanate from the persons of the sick and are widely diffused, they become comparatively inert; but what constitutes the limit to the diffusion of different substances, when locked up in the clouds has not been positively ascertained; and we are not aware how far other substances are thus acted on, although we know that the contagion of some diseases extends only a short distance from the victims labouring under their influence. It would therefore be useless to surmise, that such and such things do not exist, when we have no direct proof of their non-existence. Besides, in a hot climate, there is a deliterious property in the air, which, if not always in active operation, has at all events a tendency to be excited by the slightest cause of this nature, as will be shewn in the sequel.

From what has been now stated, if correct, we may in some measure be able to account for places being infected, at particular times of the year,—for example at the change of the monsoons, when we may have the land, instead of the sea breezes:—and now also away flies the mystery, why places so far distant and insulated come to suffer. It is not so difficult to account for those places that lie in the more distant but direct track of trade-winds or monsoons being attacked, since they must receive a portion of those effluvia with which the clouds as well as the winds, are more or less charged; and which are carried about and deposited in the manner already stated. Hence also we can account for ships at sea be-

ing attacked with endemic, or epidemic fevers, and the other distempers which generally arise from such exposure. The Cholera, as one of the number, has occurred at sea amongst the crews of ships which had been previously healthy for weeks. It has also attacked ships in the river Hooghly, that have been exposed to a certain current of air, while those on each side, and nearly at the same anchorage, have escaped. When such a peculiarity of atmosphere is present, as is supposed, and here joined to an additional quantity of marsh effluvia, or other noxious particles floating in it, who is there that can distinctly point out even the probable effects of such combinations? It was a long time, indeed, ere chemistry explained the different results produced by a mixture of many gases, and of other simple substances of themselves, innocuous but which, when united, become very active poisons. This peculiar one may for ever remain beyond her ken. What benefit would result to mankind although she could tell us? seeing she could not remove the cause, or but very inadequately so, at least in the present day. A part of the good resulting therefrom would be to satisfy the human mind which rarely contents itself without a cause, real, or imaginary, to account for phenomena which it does not understand. These remarks, as well as those which follow on the same subject, may be treated as visionary, and fanciful. They will in all probability, however, require some consideration, ere they can be disproved, I trust they may meet with a candid perusal from those able to judge of this most important subject,—for such as think that they can settle the question by their *ipse dixit* I care but little.

To proceed with the investigations of marsh miasm. Do all epidemic diseases spring up, or have their origin, in the place where they first shew themselves, and may they be-

come endemic, or *vice versa* ?—In the prosecution of this part of the enquiry it will be shewn that diseases are capable not only of affecting the place where they originate, but that they may be carried, not by clothes, or human intercourse, but by the medium of the atmosphere alone, to another and distant part. I have already stated that epidemic diseases proceed in the tract of the prevailing wind, and that they seldom deviate out of this line; this may be regarded as one point settled,—when we find them travelling in another direction, it is in the manner above referred to. Why do epidemic diseases not show themselves every successive year? Because the *materies morbi* is not generated, in consequence of a want of the exciting cause: but, on more minute examination, it will be found that there is always existing, at the particular period of the year, according to the situation of the place, some species of endemic or epidemic disease, and this of more or less intensity and fatality, according to circumstances, not only as regards the weather, but also a greater abundance or scarcity of provisions, with better or worse dieting, and on many other causes. The state of the weather, or atmosphere, however, determines this in a great degree, since either before or during their appearance, or prevalence, there may be much heat, rain or moisture in it. This may be attended either by an excess of cold, or the reverse, as depends on the nature of the constitutions attacked, and other circumstances under which it occurs. Thus then, epidemic diseases may be modified in many ways,—they may present themselves under the form of inflammatory complaints or febrile affections, or those of an opposite nature, in the first instance. From the above I am much inclined to believe, as will be stated in a short time, that all epidemic diseases spring from the same root, and are

modified, or increased according to the extent of the cause, such being in operation either in a major or minor degree of concentration.

That there has been such a disposition to epidemic disease existing in the atmosphere of Great Britain for some years, it is thought, may be most satisfactorily explained, when we take into consideration the great prevalence of influenza—a disease, in my mind, of a decidedly epidemic, as well as endemic nature. It is no wonder then, that there should be an attack of other epidemics, either of a more aggravated or modified nature, as the air becomes mixed or poisoned by that from other quarters of the globe, as well as from its own marshes and other pestilential sources. A consideration of the thick fogs so prevalent in the British channel, and German ocean, leads me irresistibly to the conclusion that such may be actually the case, and that the cause, when once introduced, may be aggravated, greatly by receiving addition from the fertile sources of the same elements in our own country. It is surely no inconsistency to imagine that these dense vapours contain, at times, substances of a very noxious quality, since we observe that neither cold nor moisture, of any degree, when applied to the human body, is capable of producing effects, such as result from the occasional breathing an atmosphere loaded with them. We know that small-pox matter, in an inconceivably small quantity, when applied to the body, either by pricking the skin, or even inhaling the air in which such patients are, will, under ordinary circumstances, in a short time produce a very large surplus, so much so, indeed, as to exceed our most extended views of the subject; and that this matter is again capable, when favourably applied, of spreading the disease;—in this

way then it may be multiplied *ad infinitum*. I ask upon what grounds can we deny the existence of a deliterious principle being conveyed to the air?— Or that this again may assimilate the whole within its range of action, and this last again to other portions, so that it will travel far and wide, until it comes in contact with a state of the air capable of dispelling it, or until it falls in the rains ; but this last may only operate for a time in some instances, as we find that the miasm again raises its diminished head, and operates powerfully on the frame. The same, of course, will hold in the case of noxious particles which emanate from other sources than the above. That such conditions of the atmosphere are present during the prevalence of epidemics I have as little doubt as that the small-pox, measles, or any other contagious or infectious disease exists. The only objection to the above is that the air is not a living material, and that it is therefore incapable of assimilating such to itself, as the engendering large quantities of the *materies morbi* from the smaller, and that it will rather tend to destroy these by dilution. This, however, is not stated as a distinct fact, and, although a convenient way of answering the question, it is not known how far it holds in reality. I am inclined to believe that air, when much contaminated, will in an equal degree deteriorate a pure atmosphere in the same manner as nitre or sulphuric acid will give its sour taste to a very great quantity of water, so much so that a few drops may be sensibly perceived in a gallon of the latter. What then is to prevent the air, which is also a gaseous fluid, from being contaminated in the same manner, although not under the laws which govern the living body. There is nothing which can at present be perceived to invalidate

the argument. In this way then, we may be able to account for the apparent eccentricities, propagation and other discrepancies attending the rise and spread of Cholera. In the atmosphere, even in its purest state, in intertropical countries, there is every reason to believe that a morbidic miasmatic principle is constantly present—this is pre-eminently the case in the island of Ceylon, and throughout the greater part of India; it is likewise to be met with on the west coast of Africa, and elsewhere, this too, when the least possible quantity of moisture is present—a state so frequently met with in these places. That such is the case also in the West Indies is not by any means improbable, since we meet with attacks of yellow fever even in the finest weather, occurring apparently out of the influence of all land-winds, and seemingly under a pure, fresh, and dry air. Under these circumstances we must not omit to take into account the operation of heat, as it exists in these places, and as strongly predisposing to fevers, that such should assume the type of the climate, and country, is just as likely as that we should meet with typhus fever from exposure to the producing cause in Great Britain. The heat or cold of the atmosphere may therefore act on the body in one way, and the particular state of the air may certainly determine the nature of the fever. Here then we have a multiplicity of causes all operating on the nervous power, and it would be strange indeed, even ironed as man is for bearing the vicissitude of climate, if he escaped all of them, which are in constant operation, apparently to curb his sway. In this manner then may be explained the reason why troops, or any body of men, are attacked by diseases of an endemic nature, even in the most clear and cloudless weather, and, in particular, when there is a sudden change

in the state of the thermometer, attended with a heavy dew, or thick air towards evening, at the times of the year alluded to, since such states indicate the presence of a superabundance of moisture. "The month of October," says Dr. James Johnstone, when speaking of a particular part of China "was so warm and the nights so "cloudless and serene, with very little dew, that many "of us slept in the open air. But in November the nights "were exceedingly cold; and although there was hardly "any thing that could be called a swamp or marsh on the "Island, yet intermitents and fluxes made their appearance and continued without any very apparent cause, "except this sudden vicissitude of the temperature of "the air. There was indeed a very high peak in the centre of the island, the sides of which were covered with "thick grass jungle; and over this the winds blew "towards the ship and tents. There can be no doubt "that hills and mountains arrest the course of marsh "miasmata through the air, and when a sufficient quantity of these is collected, they will produce their effects on the human frame, in a similar manner, as if "issuing from the original source; especially when the "pre-disposing causes are in great force. Hence we "see how miasmal fever may take place on the summit of *morne fortunée* or the rock of Gibraltar, without any necessity for the supposition that the febrific "exhalations arose from these places themselves." We can, therefore, see the reason why some fevers, which distinctly owe their existence to marsh miasmata, should occur where we have no reason to suspect the existence of any thing like this acting as a cause; but, in such cases, there can be little difficulty in accounting for their presence, if we take into consideration what I have already advanced as to the winds carrying about the

miasm. This take place even where the nature of the soil is such as not to lead us to suspect the existence of marshy grounds. But then we are also aware that these need not be necessarily present for their production, since it has been clearly proved that such soil is capable, under certain circumstances, of giving out an exhalation as noxious as the former. Why should medical men continue to resist the conclusive evidence that may be met with in the statement of facts like the present, in all authors who have treated of the endemic and epidemic diseases of hot countries. The facts are stated, but their deductions, as applied either to their operation, or the effects they produce on the system, have not been sufficiently attended to. Dr. Johnston observes “ although the season of the year was not that of autumnal remittents, yet the land winds in all seasons, and in all tropical climates, are more or less impregnated with miasmata, and that these had a considerable share in the fever above described, I entertain no doubt.” This he states when speaking of the bilious fever that occurred in His Majesty’s ship *Centurion* at Bombay in 1804.

A question of some importance to determine is, whether a ship sailing along a coast, where she meets with winds impregnated with these morbid particles, and at length arriving at a healthy place or harbour, may have disease amongst her crew ; I think that, as a matter of course, the men on board would be exceedingly liable to it. But may not the disease be modified as to intensity, or even assume a new type, by being now in a healthy place ?—it is imagined that this will also alter the nature of the distemper in the ship ; for had she remained in the place where she first contracted the cause, there can be but little doubt that it would have been at

least more severe, if, indeed, not another form of disease. We need not, therefore, in such cases seek for the cause of the disease in the place she has now anchored at, which we supposed to be healthy, we must look therefore to the places she has been at, or the coasts along which she has been sailing. It would be singular, if, where there is a number of ships lying, and with no complaint amongst them, we should not, under the supposition of the disease having been contracted where the vessel is at anchor, find seamen belonging to other ships precisely under the same or similar circumstances—consequently labouring under the same form of disease. The above, however, depends on some points which must be taken strictly into account. Suppose a ship sails from England, and arrives at Bombay, Trincomallee, or the river Hooghly, without touching at any place, and with no sick on board at the time, she will be particularly liable to epidemic diseases, or those of the country, although there may be a number of other ships at the same anchorage, very healthy, these having been in the climate for a considerable time, while the new arrived suffers from her *first* exposure. Great care therefore, should be observed by all in command to restrain their men from going on shore, and to keep them living regularly until they have been some time in the climate. A man-of-war on her voyage from England touched at the Island of St. Jago; all who had been in shore and proceeded a little way into the interior of the country felt the full effects of the climate. Returning after sunset to the boat fatigued, the miasm had full power over their bodies, and almost all died from fever, even on their *first* exposure. Had these persons returned before sun-set, the chances are that fewer would have fallen victims, as we know that the miasm acts much more

forcibly on the body after sunset than it does at mid-day. It is improper, therefore, to visit places in which such is engendered, even in the morning, until the sun has been up for sometime ; for then we expose ourselves to the mists, or dews ascending or descending, which at all times have a deliterious effect on the human frame. Hence a good rule to be observed would be not to expose our men either before sun-rise, or after sun-set ; this the more particularly applies to wooding and watering parties. But let us proceed a point further, and suppose that, after the ship's arrival, and after she has been in port for some time, many, very many, of her men are attacked,—are we to ascribe this to infection caught at the place, or from the former source ? So long as there are no other ships attacked then we may fairly conclude that the cause exists within herself, and has been imbibed elsewhere ; but if we see other ships also under the same, then we can have but little hesitation in concluding that the cause is of a general nature. That ships, under such circumstances, are capable of affecting one another with any epidemic disease seems highly improbable, so long as we adopt the necessary precautions of free ventilation, cleanliness, &c. and take particular care that the diseases are not allowed to become inveterate from mere accumulation.

Under the last supposition another important question is, will the disease from accumulation spread to others ?—of this I have no doubt, especially where there exists a free intercourse ; for the air not only around them may become contaminated, but it may even extend its pestilential influence to a certain distance. That there are some diseases capable of spreading this poison further than others, no one can have any hesitation in admitting, but how far this power may extend has never been satis-

factorily shewn ; but that it is, under certain circumstances, carried about with the prevailing wind I have no doubt. It may be again answered that the air is not like the living body, and that it is therefore incapable out of a little to make much, but that it must *dilute* the noxious particles wherever they are. I am surely at liberty to ask why it does not do so in *all* instances ?—supposing that it does in some. This particular miasm, either as produced from the human body, or from other sources, may act differently when a cause or causes are present favourable to its propagation ; what this may be I have already alluded to in a former paragraph. It will therefore be of the utmost importance to keep free from inhaling the breath of the patient, or much of the *air* in ill ventilated apartments, and under such circumstances they ought always to be well purified. Dr. J. Johnstone says “ the transports which received and conveyed home the
 “ wretched remnant of Sir John Moore’s army after the
 “ battle of Corunna, afforded the most decisive and melancholy proofs that bodies of men confined close together between the decks of a ship in stormy weather,
 “ will soon become sickly, and that their diseases may be
 “ communicated to nurses and others after they are landed,
 “ washed, and placed in the most clean and airy hospitals.” I consider one well attested fact as sufficient to set this question at rest, and that every medical man should receive such, as *one* law for his guidance, he may almost content himself on this subject without searching for other arguments to disprove it, or to brow-beat the natural laws of the animal creation :—look at the black hole business at Calcutta, &c. “ on this passage” that is of the troops above referred to by Dr. Johnstone “ a most
 “ fatal typhoid fever broke out, which spread *far* and *wide*
 “ among the nurses and medical attendants of the hos-

“pitals in England where they were landed.” We see also that these cases were capable of infecting others. This may be received as a *second* law, that cases of typhoid fever, occurring under such circumstances, will infect a second person. A question now arises whether this second person attacked will be capable of infecting a third,—of course he may, but in those cases in which there is free ventilation, the third attacked will have the disease of a milder form, for the poison emitted by typhoid patients, as we from experience know, becomes more mild and deluted by exposure to a free ventilation and the other precautionary measures resorted to in diseases of this nature. “Within a few yards
“of the spot where I now write, the greater part
“of a family fell sacrifices to the effects of *fomites* that lurked in a blanket purchased from one
“of these soldiers after their return from Corunna.” This is another point we ought to bear in mind, and it should at all events guide us in giving our advice to the heads of departments, in particular where we have an extensive spread of diseases to encounter,—for example many Cholera cases. We ought, as precautionary measures, to give directions that every thing be properly cleaned during the prevalence of the disease, as also when it has begun to give way in its intensity ; for I believe that certain states of Cholera, like typhus, may become infectious from accumulation ; but that Cholera is a disease of a generally contagious character, few, I am inclined to believe, will admit, especially in its most common form in India, this subject however will be more properly discussed in the chapter on Contagion.

Thus then we see that the effluvia arising from the bodies of those labouring under certain diseases of an epidemic nature, or others not naturally so, may give

rise to analogous diseases, as also, that the poisonous particles are diluted by the air, which may not be able to infect beyond a certain distance ; but that this differs from miasm or the noxious exhalations from the surface of the earth, and the other fertile sources whence it has its rise, as when proceeding from vegetable life, I entertain but little doubt ; for it is imagined that this last has a more extensive range than the first named, consequently its properties disseminated far and wide, are not so easily dissipated by the air, but remain in it, and are carried about and distributed by the winds. India, formerly, was by no means so unhealthy as it is now, whether this proceeded from a more extensive population and the consequent better culture of the lands, or the reverse, is not exactly the present question. To what therefore, are we to attribute its present unhealthy state, particularly as regards the production of Cholera ? To the causes so generally known as those of heat, &c. I would also add the more extensive forests of overgrown trees, impenetrable jungles, the extensive marshes, and also the great abundance of tanks which exist in various parts of the country. This subject will be fully illustrated by taking into account the past and present state of the Island of Ceylon. Formerly there was a much more extensive population, probably exceeding the present by a third ; at all events the majestic ruins of former cities, now no longer inhabited, as also the vast abundance of scattered and deserted villages, all tell a tale of desolation and woe ;—even the present towns are much less extensively peopled than they were wont to be. The consequence of all this is, as may be easily conceived, a defective cultivation of the lands, the former splendid tanks are in ruins, and this not in one or two places but more or less over the whole extent of the Island. These tanks

are so numerous that few, if any of the inhabitants, can now possibly compute the number, buried as they are, amongst brushwood, jungle and large forests ; many of them extend two or three miles in length and are nearly of equal breadth. They are consequently, from being out of repair, full of rank vegetation, crowded with insects and have their banks covered with decaying materials and mud. These things, therefore, in such a climate, form a very fertile source of disease ; another will be found in the impenetrable forests which every where abound ; these not only extend themselves, but gradually form the centre of a system of forests equally fraught with the *materiel* of disease, and derive fresh accessions of strength from the impervious jungle and uncultivated soil by which they are encircled. By their removal then—by clearing the tanks, thinning the woods, so as to allow a more free circulation of air to the country, and by the cultivation of the soil we would render intertropical regions comparatively healthy. But the means of effecting this, alas ! are not to be so easily procured, or put in operation, although apparently within the grasp as many might be apt to imagine—no, the population is gone—this most extensive Island, therefore, will continue to engender a poisonous air which may so increase from time to time as to annihilate the fraction which still remains. Such is not an overstretched picture of many parts of India as can be attested by not a few ; but the above is more applicable to some parts of the country than it is to others. It will also be found to apply to many other places of the world, such as the West coast of Africa, along the shores of Madagascar extending thro' the Mozambique channel, &c. The clearing of these lands and the culture of the soil, where it is possible, would to a certainty render them more healthy ; this, however,

would, in many instances, be attended with danger to the whole of the labourers employed, who would be placed in immediate contact with the exciting cause of the fevers, and other diseases, peculiar to the country, even supposing that a sufficient number could be provided during the period of years for the accomplishing of such a desirable object. This would be in truth a forcible malthus speculation, the period when it may be carried into effect cannot be decided on or even contemplated, but when it is, we will find that epidemic disease will be of much less frequent occurrence than at present, as is evidently shewn by tracing the history of our own, as well as other countries, in which diseases depending on this as a cause, were, in the more early periods of its history, much more prevalent than they are now; in fact they are exceedingly rare. I could illustrate the point further by taking into account the condition of other countries; but examples of this sort must be familiar to most men, even partially acquainted with the subject.

It has been said that these miasmatic particles have not the power of acting on the human frame when widely disseminated, and therefore that their power must be chiefly confined to the spaces in which they are produced. I have already stated that this has never been satisfactorily accounted for. Even admitting the premises for a moment only, we would find in every soil, but, particularly in India and other intertropical climes, of sufficient magnitude, that the constant engendering of such miasm must soon come to saturate the atmosphere—where is it then carried to?—for thus we will have that operating power *diluted*, as it may be said, by the very air capable of itself of producing disease when these particles are in an extensive state of congregation. That complaints arising from such causes may in this manner

be propagated over a great portion of India, or over the land where they arise, and that they must spread in proportion to the concentration and the susceptibility of the patients for imbibing these impressions cannot admit of a doubt. We must never forget that other causes co-operate wonderfully at the same time in either favouring or retarding their operation.—such as heat or cold, wet or moisture, with a multiplicity of others, some of them to be afterwards noticed. How does it happen, on the changing of the monsoons in India, that in certain places, we generally meet with disease ;—this happens twice every year in the Island of Ceylon, particularly at Trincomallee. We need not be astonished at this occurrence when we consider what I have elsewhere stated concerning the confined air, which now escapes from the extensive woods, and from being in a manner shut out from the *direct* circulation of the ordinary currents of the atmosphere, and combines with that proceeding from the tanks, superabundant vegetation and the other sources of noxious vapour. Such then does not depend on the mere change in the weather, but on an excess of these ingredients at these particular times of the year, and will, when the change of the monsoon takes place, rush forth like a current of clayey water bursting its boundary, and impart its concentrated particles to the more pure air, just as the latter destroys the purity of the parent stream. In this way then, may be explained the unhealthy nature of the above place at these two particular periods of the year, when the inhabitants are subjected to dysenteries, intermittents, and other diseases depending on this cause for their endemic or epidemic appearances ;—amongst these I certainly place Cholera. It is not intended, at present, to enter into any consideration of this point so

far as regards infection ; from what has been already stated it will be plainly perceived that I do not regard these diseases as depending on contagion, or that one man, by touching or handling the body of another, will *necessarily* be assailed by the disease, merely from this as a cause. That he may be infected by being *confined* to the same place I have no doubt, this more particularly when placed under the circumstances noticed.

The Medical Board of Bombay say “ concealed from
 “ our view as the exciting or proximate cause of this formidable malady may ever remain, we have only to observe its effects, and the united testimony of all who
 “ have witnessed it seems to shew that it is *somewhat*
 “ which presses heavily upon the vital functions ; and
 “ on many occasions resembles the effects of a poison
 “ taken into the stomach or applied to the blood ; but
 “ whether it acts more immediately upon the circulating
 “ system or the nervous, we cannot determine, the various modes of attack, which have given rise to the
 “ division of the disease into species and varieties, would
 “ lead to the supposition that sometimes the one, and
 “ sometimes the other may be the case.” It is not for a moment intended, even were it practicable, to criticise the authors of these most interesting reports, which I have only in truth met with as quotations by others. I trust, however, that the points alluded to, will be satisfactorily cleared up in these pages, and I shall also point out that the *first* train of effects does not take place *in* the blood, and that when this comes to suffer, it does so through the medium of the nervous system. Admitting that the premises already stated, with respect to the conservative principle, animal heat, the blood and secretions, the brain and nervous system, with the sympathies that exist in the human body are correct,

and that the cause of this disease is in the derangement of the nervous system, it is no wonder if we find that “ other animals, as horses, cats, dogs, and fowls, together with fish in rivers and the ocean, and even vegetables, have borne their share in the calamity ; the pestilential principle has extended to every principle of life. The beasts of the field perish with deadly epidemics, the fish on the bottom of rivers and the sea, die or become lean and sickly, while corn is blasted on the most fertile plains, and the fruits in gardens and orchards wither or fail to arrive at their usual perfection !” These last, in their turn, especially in hot climes, when ripe and allowed to rot on the branches give rise to a further spread of the calamity. There are particular states, connected with the condition of the atmosphere, in which the Cholera is more prevalent than at other periods. That it proves more intractable, and of more frequent occurrence in rainy weather, or during the changes of the monsoons, particularly in India, cannot be doubted.

It is not to be wondered at, that, in such a climate, where the rain is at particular seasons heavy in the extreme, we should have disease breaking out, neither can it be matter of surprise that it should prove a stimulus to those sources from which the cause of the epidemic more immediately springs. Under such conditions of the atmosphere as are induced by close, misty, dewy, or rainy weather, it is no wonder, when miasm is produced by the formerly dry soil itself, that we should have it in much greater abundance from the adjacent sources more favourable to its production. In short, we may view the state of the country at this time almost on a parallel with that of Egypt after the overflowing of the Nile, when the waters have retired within their banks. The moist earth now ex-

posed to the influence of a powerful sun, exhales a vast abundance of miasm, or whatever else constitutes these noxious particles, which give rise to fevers, dysenteries, intermitting fevers, &c. These, which exist in proportion to the extent of the exciting cause, are modified by certain peculiarities of soil, or the constitutions of the patients. The diseases, in such instances, will be found to subside in every part of the country, in proportion as the weather becomes more mild, dry, and clear, or when the abundant moisture has been either absorbed or evaporated. Now, it does not necessarily follow that there should be marshes present for the giving out of these morbid particles; I believe that any sort of soil, under the circumstances stated, gives out something of a noxious property, but in a greater degree, in those places which are of a marshy texture. It is about this period at Bombay, viz. when the wet weather sets in, that Cholera, or fever to any extent, appears, and it is then destructive in the extreme. The fields of paddy or rice being now cut, have the roots remaining in the ground; these become decayed, and, in co-operation with the soil itself, will act detrimentally on the constitutions of those who are unluckily exposed to them, particularly at the period referred to. Many persons have been attacked by fever, in this way, unknown to themselves, from the bare circumstance of passing through them in their visits;—more particularly after sunset. From the above, we must not conclude that the disease always depends on this solely as a cause, for we will find it existing under the other states of the atmosphere; generally, however, the clouds are heavy and lowering, and the weather is dull a little previous to the prevalence of the epidemic.

Now, in those instances in which we have no rain,

the very state of the close and damp air, will prevent the evaporation from the surface of the earth from being freely dissipated, as would otherwise have taken place under a clear sky with a gentle breeze ; but, in such instances, we have nothing of the latter states present, consequently, from the heat, there will be an increase of the miasm, equally productive of disease. Although, under such circumstances, we will, in general, find that the attacks are not so severe, unless perhaps in the Island of Ceylon, which, as we have seen, is particularly subjected to the reign of epidemic complaints, from the peculiarity of its soil, as well as the extent of its forests—these last, by rendering it comparatively cool, might be considered unfavourable to the production of the disease. Here the sun's rays cannot penetrate the earth with the same facility as at Madras, where there are comparatively few forests or jungles, &c., at least in its immediate vicinity ; consequently, when the sun has set, the earth has not much heat to give out in the former instance, and in the latter the heavy rains may, at times, beat down the morbid particles, and thus prevent the disorder from proceeding with such rapid strides. There will, therefore, generally, under such a state of things, be a suspension of the disease,—its powers at all events will, for the time, be decreased. It may, however, return with a renewal of the cause, or with the dry weather : but even then it may not prevail to such an alarming extent, since now there is perhaps more wind, with a more serene sky, which allows the noxious particles, as they are engendered, to fly off with greater rapidity, than under the former circumstances. The disease may even spread more rapidly during the prevalence of heavy rains, especially when these are attended by chilling colds, or oppressive heat, since

whatever tends to disturb the animal economy, under these conditions, will, to a certainty, be a predisposing cause to the spread of the epidemic.

The closeness of the weather, which prevails at the commencement of the rains, and which, at times, is found to continue a few days, may be a cause of the rise and continuance of the attacks. The vapours from the surface of the earth, under the circumstances of close sultry weather, cannot ascend to any great altitude, and as there is no wind to carry off these noxious ingredients, they become concentrated at the surface for the time, and the body is very liable to be attacked; —some severe cases may then be expected, and they usually occur. This was the sort of weather experienced at Trincomallee, in the months of October and November 1832, when the disorder raged severely. Were it necessary to enlarge much on this subject, I could bring forward a hundred instances, at least, to prove the full force of the above, as regards the state of the weather now given. Such, however, is so well known to every medical man in India, that it requires no more than the statement. From this, then, we may be led to the distinct conclusion that the rains, with the state of the weather previous to, and after them, are causes operating, through the influence of the soil, in the production of Cholera. Under such circumstances, we have only to recollect that the gases evolved from the earth, particularly in hot climates, must be immense; this is pre-eminently the case in woody, marshy and fenny countries, where there is not only an excess of vegetable products, but also so much decayed and decaying animal, as well as vegetable matter. The slow and partial decomposition of large succulent fruits, hanging from the different plants and trees, exceeds all belief to those who

have not actually witnessed its extent and magnitude. All these things must contribute greatly to the production of epidemics: they are, however, modified by certain states of the air, as to their extent, and the nature of the acting or exciting cause, the constitutions assailed, as also the climate and nature of the soil. It is no wonder then, that any, or all of the above causes, should produce such an effect—the wonder is that so many persons should escape from the effect of a cause so universally prevalent. If correct in my opinion, seamen may be considered happy mortals, since all they have to do is to set sail, immediately on the breaking forth of such, and proceed into as clear and open weather as possible, always keeping an eye to *windward*; if that leads speedily to the wished for serene weather, and out of the influence of the land winds, it will be found that the disease, especially if that is Cholera, speedily disappears. Care however must be taken to have as free a ventilation in the ships as possible, so that the air may circulate readily through every place. Beating to windward may not always answer the purpose, for it might be too long ere we could get into such fine weather, as we know to exist at another place at a shorter distance and to leeward, and to which in such a case, we ought to resort. Upon these principles, of good and serene weather, would I ascribe the otherwise healthy state of India, at certain seasons of the year. The evaporation, such as it is, from the earth's surface is neither so great, nor so confined, as when it has been soaked with water, with a close thickness of the weather which may be as hot as we generally find it, yet will not, on this account, prove injurious, or contribute to the existence of such diseases as Cholera. But, on the other hand, in proportion to the previous heat, when the

wet weather again sets in, so will the body be predisposed to epidemic attacks, from the stimulating and debilitating effects produced on it, by a long continuance of the very hot, healthy and dry weather.

I would answer those who believe that Cholera is not caused by any thing noxious being imparted to the air, in the same manner as they reason, or defend themselves, with respect to those who escape complaints, such as small pox, which are truly pestilential and contagious. It has, I believe, been stated that, did the air contain any thing noxious or bad *all* should be seized at once. This, however, is prevented by peculiarity of constitution, or the same cause which has been urged as to contagious diseases, were it otherwise, the earth, long ere this, would have been depeopled. Therefore, peculiarity of constitution, with the other causes operating so as to prevent *all* being attacked by a truly contagious, or infectious distemper, will also operate powerfully in preventing all being attacked by this or that epidemic. Here then, we may see a wise provision of nature for the relief of mankind, and will find that the argument, when properly viewed, will fall to the ground, as futile in the extreme, for all these things depend, as will shortly be stated, on the power of the nervous system. Besides do we not very frequently observe that the disease is sudden, and unexpected in its visitations, attacking many at the same time, nay at the same instant as it were, which could never occur did the production of such depend on a specific contagion?—but more of this in our remarks on that subject. The miasm, on the banks of the Ganges, is often severely destructive to human existence. “ This
“ exhalation is capable of concentration, or rather accumulation ; for when it is detained amid woods, and jun-

"gles, as at this place, and especially during the
 "rainy season, when there are no regular breezes to
 "dissipate it, and when the beams of the sun are ob-
 "scured, except at intervals by dense clouds, it becomes
 "exceedingly powerful, as the annual mortality too plain-
 "ly proves." The mountains which intersect a country
 will, and do operate strongly in the production or
 modification of disease, by preventing a free circulation
 of the air. There is in the middle of Ceylon, or
 nearly so, very high land or mountains, the far-
 famed Adam's Peak is there, and is often for weeks
 enveloped amongst the clouds. That chain of moun-
 tains, I have no doubt, forms a formidable barrier to the
 free circulation, or perflation, as it generally attracts
 the clouds, consequently there must be at some one sea-
 son of the year, in the places to leeward, a great proportion
 of moisture existing, which we in general find to be the
 case. The other causes in operation all play their share
 in deteriorating the atmosphere; thus, as we have cause
 heaped upon cause, and all acting together, it is asto-
 nishing that there is not a total annihilation of man-
 kind in such places. A brisk breeze, at the changes
 of the monsoons, will quickly dissipate the noxious
 particles, and this may be one reason why an epi-
 demic is not prevalent every season; or the previous
 season may not have been favourable for the genera-
 tion of the miasm; or it may have become greatly
 expended during this time, and will not consequently be
 so apt to be produced during the present period.
 There may, in some seasons, be only a few cases
 at this particular time, evidently shewing that the cause
 is in existence, and would operate, had it not been
 greatly dissipated by the wind. There is nothing there-
 fore like a free and open state of the country for pre-

venting such occurrences, this generally, *ceteris paribus*, is by far the more preferable, and we will have much less chance of periodical attacks; we may even entirely escape when there are no large forests to confine the air, or other helping causes to deteriorate the soil.

Some may be inclined to imagine that changes are produced in the state of the atmosphere itself, at the particular period when Cholera is prevalent, so as to be the cause of the disease. How far it may depend on heat, or cold, or barometrical changes, it shall be now our business to enquire. I shall afterwards, in support of the opinions already narrated, adduce another circumstance sufficient to establish the point of bad air being a cause of Cholera. I cannot by any means give my assent, that a change produced in the weight of the air is the sole cause of epidemic disease, although Dr. Cullen observes “ a considerable and sudden diminution of the weight of the atmosphere, which “ seems to occasion the same effects as heat by “ producing also an expansion of the blood.” Surely the Doctor could not imagine that this, as a cause of disease, ever took place at the surface of the earth, or why did he not actually state it. We are all well aware that ascending very high mountains will produce some diseases; many cases of *hemorrhage* from this as a cause, may be met with amongst travellers and experimenters. Why do people live, and this without any inconvenience at the height of nearly twenty thousand feet above the level of the sea; and yet we observe none of these things occurring amongst them, so that the idea of this rarification of the air being a cause of an epidemic is entirely removed. Some peculiarity, however, may be met with here, and I may be

answered that at the top of the extensive table-land in Mexico a new atmosphere is formed and rests there, and that this would in all probability be the case in other parts of the world, were there an equal extent of level surface to afford lodgement for another atmosphere which may be condensed at this great elevation, and under the circumstances noticed. Dr. Cullen's opinion I am afraid has led others to imagine that such a rarified state of the air may exist near the surface or actually upon it, in what may be called *this* world; accordingly they have entered into long details to shew grounds for their assertions, but, however plausible in appearance it is believed that it is not to such a quarter that we must look for an explanation of the rise and spread of epidemics. Besides the barometrical changes in those places in which diseases of this class, particularly the Cholera, have occurred, have not been such as to lead us to the idea that this depends on the tenuity of the atmosphere; nor have the thermometrical variations, or those of the hygrometer been so great, as to alter our opinions concerning such as causes. Heat is not, therefore, to be admitted as the general cause of Cholera, as it shews itself in its epidemic form in India; superabundent heat, in all cases, is not sufficient to account for these occurrences—the variation in temperature, during the prevalence of the disease never being many degrees above or below that of the preceding weeks, in some instances, indeed, there is no observable difference, other than might be expected from the change from dry to wet, which is not considerable.

It has been also imagined that the abstraction of oxygen from the air, is the generating and prevalent cause of this disease. No experiment, however, hitherto instituted, can lead us to such a conclusion. We know

well that any one, when unfortunately exposed to deteriorated air, or that which has suffered from an abstraction of part of its oxygen, will die; but he dies with symptoms very different from those of Cholera. Besides, it is not likely that this, as a cause, could be of so universal a nature as to spread over the globe. I must therefore, until it be shown to the contrary, continue to think that I am right in the opinions advanced, as to the origin and spread of Cholera. We may easily perceive that it does not arise from any diminution of oxygen in the atmosphere, by taking into account those sporadic cases of the disease, which we observe so frequently in India. Let a person expose himself, while very hot, and under a copious perspiration, in a place where the air beats on him, as it were, in its passage; in such a case we may have either a fever, a dysentery, cholera, or a common cold, or many other complaints produced, which owe their existence to a certain something in the air; or the disease may be modified in various ways, such as by the power of resistance in our patient's nervous system. Now, in the above example, we have *more* oxygen than is wanted, for the air passes rapidly over him and, as it impinges on his body, produces its peculiar effects on the nervous extremities. There is, therefore, no deficit of oxygen in such instances, for even in the places in which this, as a cause, may be said to be most favourable for such occurrences, nothing of the sort takes place, as is evinced by the healthy state of the population. It is surely more likely that there is, something floating in the air, which, when other causes of sufficient magnitude are present, may by encountering the body, under the favourable state above supposed, produce its various effects. As to the operation of cold on the human body Dr.

Cullen observes, that it is a point of much difficulty to determine how this acts, under all states and conditions, for such depends on the following : “ 1. The intensity
 “ or degree of the cold; 2. The length of time during
 “ which it is applied: 3. The degree of moisture at
 “ the same time accompanying it: 4. Its being applied
 “ by a wind or current of air, its being a vicissitude,
 “ or sudden and considerable change of temperature
 “ from heat to cold.”

It will be found also, on minute attention, that Cholera will occur in clear and fine weather, or in that state of the atmosphere which is unattended by rain, or thick clouds,—so that no suspicion of a deficit of oxygen can be entertained. We will find that, during such states of the air, there are generally, if not always, very heavy dews at night, and that the exhalations in the morning are consequently very considerable;—we may not unfrequently find that these vapours are sufficient to *moisten* the surface, and to keep it in this state for some hours. Thus then, people passing to and fro, in such places, will be liable to be assailed by this cause. It will also be found that there is no deficit of oxygen although the disease does not always occur when there are heavy rains, and close weather, at the time there may be a tendency to Cholera or some other epidemic attacks. But that there is an evident attempt to establish the reign of some epidemic, under these conditions of the atmosphere, may be seen by the greater abundance of fevers, dysenteries, &c. such attacks being modified by the various causes already stated. Admitting, for the sake of argument, that the weight of the atmosphere were reduced during the prevalence of Cholera, what, let me ask, does this show? We know that by ascending high mountains we can

greatly diminish that weight, as is readily indicated by the barometrical changes ; yet we may ascend to a very great height, to the extent of several thousand feet above the level of the sea, and none of the symptoms of Cholera (unless perhaps one) are ever produced. The atmosphere being light, free, and unencumbered, do we not find that our *spirits* are more buoyant accompanied with many other sensations. There is in our ascent a hæmorrhagy apt to be induced, but epistaxis does not occur in all cases, what then should our deductions be, all things being equal as to the lightness of the air at both places, the same phenomena should certainly present themselves in each case, but as they do not, it follows that we must look for another cause than the mere tenuity of the atmosphere as the origin of Cholera, as well as of other epidemics. The symptoms of this disease have a closer resemblance to those arising from poisons than any thing else they can be compared to, being so uniform in their appearance, in each instance, that, did we not know that Cholera was present, we would be very apt to say that the patient had taken poison. Hence it follows that we must give up the idea that the tenuity of the atmosphere is a cause, although shewn by barometrical changes. The phenomena attending an ascent into the atmosphere are generally uniform in their operation, and affect the individual, according as he may be of a robust, or weakly constitution. It is the nervous system we have to do with, as the resisting power in all these cases. *No doubt in Cholera we have an hæmorrhagy*, but so far as I am aware, no attempt has been made by any author ancient or modern to account for it ; therefore I cannot allow it to be the criterion of an analogous action, for it is an hæmorrhagy *sui generis*, and only capable of

being produced by a cause or causes of a certain nature, applied to the human body; even poisons, although they produce many symptoms of the disease, frequently leave out this one in their action, and there are none of them that act on the blood, or general system, in the *exact* degree in which Cholera does, hence in no case is there a perfect similarity in their effects. I will afterwards show that there is a hæmorrhagic action but that this is deficient in the *red* particles, or colouring matter in general, so that it is distinguishable from all others of an analogous nature, as respects its appearance as a symptom in other complaints. Again, as to the tenuity of the air being a cause, why does it not operate more generally and on all, during the prevalence of Cholera, which it certainly ought to do? I cannot for these, and other obvious reasons that will appear in the examination of this subject, succumb to the opinion, for we will find that there is generally an additional *load*, a somewhat pressing heavily, as it were, on all during this period, the heaviness and oppression are much greater than can be ascribed to a *weight* being removed from the air:—even admitting that the body feels oppressed in a very light air, we must look to something else for an explanation of these phenomena, as this oppression proceeds from a different cause than the one supposed by others.

As to heat or cold being a general cause—few will hesitate to subscribe to the opinion that they are nothing else than, at times, powerful pre-disposing ones, as formerly noticed,—I cannot therefore, admit that they are of a universal nature. Cullen observes “ the circumstances of
 “ persons rendering themselves more liable to be affected
 “ by cold seem to be. 1. The weakness of the system

“ and particularly the lessened vigour of the circulation
 “ occasioned by fasting, by evacuations, by fatigue, by a
 “ last night’s debauch, by excess in venery, by long
 “ watching, by much study, by rest immediately after
 “ great exercise, by sleep and by preceding disease.
 “ 2. The body or its parts being deprived of their
 “ accustomed coverings. 3. One part of the body
 “ being exposed to cold, while the rest is kept in its
 “ usual, or a greater warmth. The power of these cir-
 “ cumstances is demonstrated by the circumstances en-
 “ abling persons to resist cold. These are a certain
 “ vigour of constitution, exercise of the body, the pre-
 “ sence of active passions, and the use of cordials.”

The above is so concise a narration of facts that I would have done an injustice not to have copied the whole of it, and it is believed that their *modus agendi et operandi* can only be satisfactorily accounted for on the supposition of the different impressions being made through the medium of the nervous power, in particular when we see the whole body labouring, at *once* as it were, under febrile symptoms, after a very short exposure to them, as an agent in the production. The operation of cold on the lungs, or on the circulation, cannot be sufficiently well accounted for on the supposition of its acting *primarily* on these functions, or more properly on their substances. They are not the *sentient* power, but the cause must act on it, and it is in this way that almost every thing operates whose tendency is to disturb the animal economy. These parts then cannot maintain themselves in existence, but depend on another power whose constant operation is necessary for the proper performance of their functions, which, by being in any way impaired, will immediately propagate some of its diseased or dis-

turbed action, to the heart, lungs, bowels, &c. These, when assailed, will form a double cause of oppression to the system, since, as was before remarked on the subject of Sympathies, a disturbance in any part of them will re-act, and thus tend to the heightening of the disease. We are now well aware that any cause deranging the action of the phrenic nerves will either increase, or diminish the powers of the diaphragm, and that the respiration, with the circulation, will then in its turn be disturbed. Any cause operating so as to throw the nerves of the heart into disorder will derange its actions, so that these will be either in excess or deficiency, according as the lesion is severe, or the reverse. Let us then not shut our eyes so closely as to prevent our observing a point so evident, and at the same time so important, that we must take it for granted, ere we can illustrate the whole functions, or the multifarious operations of the body in a satisfactory manner;—by adopting a different course, we cannot account for many perplexing and obscure phenomena of the system. That the nervous power is chiefly concerned in the production of fevers will be at once perceived, when we consider that the shrinking of the features, the cold sensations, particularly about the extremities and back, and thence passing over the whole body in regular succession, with many other phenomena, cannot depend on the state of the circulation as a *primary* cause,—by looking to the nervous system, however, we will be enabled to explain the whole in a satisfactory manner. If this be what the older writers meant by the *vis medicatrix naturæ*, they, in my mind, took up the point and handed it to us in a tangible form, and now a-days this may be properly defined the nervous, in place of their *supposed* power. That cold,

under these circumstances, may disturb this power I have no doubt ; and that a variety of other effects will be produced I have as little hesitation in admitting, but the extent to which this may proceed will depend on the state of the patient, the constitution of the atmosphere, and many other concomitant circumstances already fully stated. Cold, as well as heat, has a diversity of actions, according to the condition of the body, at the time of its application. It has a sedative and stimulating, power, and, as Cullen supposes, an astringent, and tonic one also. Heat has somewhat the same operation as the two first named, but it shall be more fully considered in the chapter on Treatment. In the mean time, I observe that each will prove powerfully injurious from long exposure, &c. these are so well known as to require no explanation, they are passed over therefore, for the present with this single remark that a sudden transition to either extreme of heat or cold, in any climate, must always be attended by injurious consequences ; we should therefore, at these particular times, take particular care not to expose ourselves to their influence, when it can be avoided.

To return to the subject of bad air, as a strong predisposing cause of Cholera, I may be allowed to narrate a circumstance of importance, in corroboration of my views, as to the rise and spread of the epidemic. In the beginning of August 1833, His Majesty's ships *Melville*, *Undaunted* and *Alligator* were lying in Trincomallee harbour, all perfectly well, and the place itself was healthy—being free from any thing like epidemic disease. The *Undaunted* and *Alligator* sailed for Madras on the fourth of the month, and arrived there after a passage of seven days ; the crews of both ships still in good health, with nothing of sickness, but the common ca-

sualty occurrences. During this time I was Assistant Surgeon of the *Alligator*, (having been sent to her from the *Melville*,) and therefore had an opportunity of marking correctly what occurred. The *Undaunted*, while lying in Madras roads, had her lower deck painted; on this her men usually slept, they were not, however, allowed to sleep there during the time that the paint was drying; at this time they slept on the main deck, which is immediately above the former. In a short time, a case of Cholera occurred which speedily ran its fatal course, shortly after this, several were attacked and there were some deaths. It must be observed that these early cases occurred amongst those who had been previously much annoyed with dysentery and who were, at the time, in a state of debility. There were doubts entertained at first whether these cases were those of Cholera or not; the afterpart of the business, however, soon put an end to all this sort of doubt. For two or three days, from the first death, she did not number more than six or seven on her sick list, but then the disease began to assume a determined aspect. In another day, or so, she went to sea on a cruise, and, before her return, had Cholera cases to the amount of 103, with only 8 cases of death, from its commencement until it entirely ceased. The Surgeon of the *Undaunted*, very properly in my opinion, in the returns to Head Quarters included all bowel attacks, at this particular time, as Cholera cases. In the *Melville*, in October 1832, we had above 50 such cases, with only 3 deaths. When she first started on the cruise, the cases continued to increase daily until they hauled their wind, or laid her broad-side to the breeze; there was then a sudden and visible change, as regards the admissions; next morning's list presented fewer, and in place of there

being above thirty in one day, there was not a half of that number, and the day after still fewer ; in this manner, the cases went on decreasing until there was not a single admission. This occupied a period of from fourteen to sixteen days,—she sailed on the 21st. August, and returned to Madras on the 8th September 1833. Shortly after this, I was directed to join her, and wait the arrival of the *Melville*. It must be stated that there was not a case of Cholera in any of the other Ships at the anchorage, nor any appearance of it on board the “*Alligator*,” which lay only at a short distance from the *Undaunted*, and the *outermost* ships in the road-stead,—the only wind which could reach them at *first* being the sea breeze. The *Melville* traversed the same tract of coast, on her passage to the Hooghly, immediately after, still not a case of the epidemic, or any thing like it occurred. The Cholera, and a famine were, at the time, committing depredations on shore, and many died, notwithstanding the exertions of the Local Government to avert the calamity. Let me ask why the Cholera, under the circumstances stated, no other ships being attacked, was so sharply dealt out on board the *Undaunted*. The cause appears to me to be so evident, that few if any can contradict it—it exists in *one*, or perhaps *two* points alone, but I would be inclined, almost exclusively, to attribute its presence to the noxious gases emitted from the paint while drying in such a climate, and particularly at such a season of the year. The only objection that can be stated is that the painters slept on the lower deck, (the one painted,) and escaped ; yet this can only go to prove a point already so well known—the insusceptibility of the human body, in certain cases, for receiving accustomed infection,—and that this was one to which such men-

were habituated there can be but little doubt. I can have but little hesitation, notwithstanding this apparently counter indication, in stating that the bad air which was engendered from the wet paint, by escaping from between the decks, through the hatchways, and coming in contact with the mens hammocks at night where they were sleeping, was the cause of the whole disturbance. This then, was the pestilential blast, and the only one, which passed over her in the production of the disease. The bad air from the paint could only escape by circulating amongst the men ; and I say that these very men, although apparently further removed, were actually more exposed than the painters, who slept on the lower deck. This may appear a strange circumstance to many, but let it be recollected that the windsails, or drying apparatus, dissipated the noxious particles, and prevented them from collecting at the bottom of this deck where these few men slept—this is the reason why they escaped, and why the others suffered ; besides, the great concourse of people on the one deck is also to be taken into account. The *Undaunted* had just arrived, two weeks before the Cholera appeared in her, from the Cape of Good Hope station, where she had been upwards of two years and a half, and her men had certainly been inured to a hot climate, by having been long at the Mauritius, where she had suffered from dysentery. Immediately before her arrival in India, she had also returned from a cruize on the western coast of Africa, about Sierra Leone, the river Gambia, and the Island of Ascension, &c. ; thus her men may be considered as habituated to an intertropical climate. Some of her crew, while at the Mauritius, had certainly had attacks of dysentery, but, according to the Surgeon's account, had perfectly recovered, with the exception of two or three

who were, as above noticed, the first to be attacked with Cholera. The *Alligator* had been at *Manilla* in the preceeding month of October, and remained there till the 29th November,—the “*Peacock*,” an American man-of-war, was there, at the time, and remained until a fortnight before the *Alligator* sailed. “They were in a very “sickly state while at *Manilla* having lost seven men “from Cholera in as many days.” The crew of the *Alligator* were all this time in perfect health. The cause of the Cholera in the *Peacock*, is also to be considered the same as that in His Majesty’s ship *Undaunted*. She was rather furiously attacked by the epidemic, although the men before the deck on which they slept was painted, were in excellent health. Therefore the two ships were precisely under the same circumstances, as regarded the severe heat of the weather and paint. From the above, we may draw some important deductions : it will no doubt strike every one as strange that so long as the *Undaunted*, while on her cruize, kept before the wind, the cases of Cholera continued to increase. But almost the moment she hauled her wind the disease began hourly to decrease, and continued decreasing until not a single case occurred, which happened in a short time after. We need not be surprised at this, when we consider that a ship, before the wind, has not the same advantages of a free circulation of air which she has when sailing with her broadside to it, when it is independent of the wind-sails—being admitted by every port hole. I think that the above narration of facts, as they occurred, goes far to prove that certain noxious substances, or particles, are capable of producing the disease in question, under certain peculiarities of weather, which at that time was oppressively hot. There was an evident

tendency in the atmosphere to the production of epidemics, as was evinced by the Cholera being at Madras, at the period when this ship was attacked, but that it was owing to the paint will appear when we take into account the Cholera attack of the American vessel at Manilla ; where, I believe, no epidemic of this nature existed on shore. I have, in conclusion, to observe that had there been a tendency to fever or dysentery then the above cause would just have been as likely to have produced these as it did Cholera; for, when a disease is once in operation, and taking the lead, so also is there a great tendency of all attacks to assume the particular type of the complaint then prevailing. There is one deduction of paramount importance, as to painting ships or even cleaning their holds—it is in inter-tropical climes that such ought *always* to be done during the best period of the year, and at the most healthy place on the station, and, if she requires to be painted inside, we should see and have our men as commodiously lodged elsewhere, either on shore, or in other ships, as we may have opportunity.

An important subject of enquiry is how long does the miasm, as given out from the earth, or other substances, take ere it produces its effects on the human constitution. That there can be no fixed or determinate time for its operation will appear if we take into consideration several circumstances that may have occurred from the time of being exposed to its effects, to the breaking out of the disease. I speak now more particularly with reference to marsh miasm : it has been stated that generally a week elapses, after exposure to the morbid principle, ere the disease shews itself. That this may be a general result I readily admit as regards intermittent fevers, but that, when the miasm is

more concentrated, it must act quicker, as in the production of Cholera, I have little doubt. Whether this proceeds from certain undefined degrees of the miasm, at its maximum, or whether there is a something else given out by the soil itself, or some change produced in the air, I cannot pretend to state. I can have no hesitation however, in maintaining that the effects are as stated, be the *cause* what it may. I also imagine that different poisonous states of the atmosphere will require indefinite times for shewing their operation on the human body, and, as in the case of poisons, this may be in the course of an hour, or after the lapse of many days. We need not cavil about the manner in which it gains access to the system, so long as we know that it does gain admittance ; we may soon settle the question when we consider that people cannot be prevented from eating, and breathing, either through the nostrils or mouth, and that we cannot defend the skin from being a means of its ingress. It is imagined that this last is one great channel through which the exciting cause enters *ab externo*,—this opinion I advance in opposition to that of most medical men on the point. We have only to consider that the atmosphere is capable of penetrating every body, of whatever density it may be,—do what we may we cannot prevent the air from gaining access, nor can we press it entirely out of any, or every particle, of animate or inanimate substances. This may be one reason why those who visit and handle small-pox patients or persons labouring under other contagious diseases are comparatively safe, if well protected by oiled silk or bladders on their hands, &c. Thus then, the air, in whatever manner it enters the body, will operate on the sentient extremities of the nerves. I have shewn, or will do so, that they are often the first parts as-

sailed by the disease and that they, in their turn, will propagate the action to the other parts of the system, and this too at times rapidly, nay the attack may even shew itself before this action has got the length of the *sensorium commune*; but, when the impression is made there, it will be rapidly communicated to every portion of the body, and now the whole of the nervous power being brought into action, the certain effects which follow are either speedy dissolution, severity of symptoms, or they may be less intense, according as the powers of the body are favourable for resisting, or will readily yield to such impressions. The nervous system is and must be affected by a number and variety of circumstances as already stated, as well by the duration of time the person has been in an intertropical climate, as by many other collateral causes. It must not be imagined that, by strength of constitution, I mean firmness or rotundity of body, by no means, since we know that the stoutest suffer not only in Cholera but also from the fever of the West Indies. None therefore, can tell what their fate may be on a first exposure to the influence of this cause, —in twenty people, it may even shew as great a diversity of symptoms, or manner of attack;—even in some the nature of the disease, whether this be a fever, a dysentery, a cold, an erysipelas, an influenza, or Cholera, may be altogether different, such depends much on the state of the climate, whether hot or cold, and also on the particular time of the year, &c. It would be almost impossible to point out distinctly the different phenomena that attend each, or every modification of attack.

I am convinced that the more closely we examine into epidemic fevers, or epidemic disease of any kind which owes its existence to miasmatic particles,

from whatever source derived, the more will we be inclined to believe that *all* of them operate more or less, from their origin to their termination, on the extremities of the nervous system, through which the other parts of the body are influenced, and that one part, or organ, in particular, will be found to suffer in all fevers—the brain and liver, especially in endemic fevers of the West or East Indies. In the yellow fever of the West, the skin also, after a time, assumes the yellow appearance, but this is when the fever is fully formed. In the fever met with at Batavia, there is certainly a strong tendency, in most of the cases, to assume this characterestic appearance, and it often does so. Can this be said to depend on the absorption of bile ? I should think not, for the yellow tinge does not appear either in the skin or system by absorption at the onset,—when present however, it may heighten the colour. I think that this peculiarity of caste depends, in a great measure, on the nervous power being, in some way or other interfered with, and that it shews this action either through the medium of derangement in the coats of the skin, or in some other way. There is a peculiarity of appearance, as well as sensation, to be met with in the skin of Cholera patients, in the more severe forms of the attack ; in these it assumes a *dusky whitish* colour, approaching to a light leaden grey, with a strong impression of cold communicated to the hand of another. It is imagined that such depends on an interference with the action of the nerves of the surface, and consists in the total or partial abstraction of their power. We see similar changes occurring in other diseases, and varying in degree and brightness of colour :—may such changes not depend to some extent at least, upon the derangement of these nerves, and does this not take place in proportion to the disturbing cause ? I think that it is not all im-

probable ; for in some diseases of an epidemic and endemic nature, less intense than Cholera, we see different changes taking place in the skin, according to the force with which the disease attacks and progresses. A change is thus produced in the colouring matter of the mucous coat, which now undergoes some modification of action, in consequence of the deficient supply of nervous power,—this operating to the extent, and according to the nature of the particular disease. We should, under all these circumstances, give very guarded prognosis as to the result of the case, since it may, and often does indicate a fatal tendency. I have said that it is not known what the particular change is that takes place, but that it depends on the nervous power being interfered with, many others as well as myself may believe,—at all events, the presence of such changes in the skin is always indicative of a high state of severe disease. In all severe epidemics we may by minute, or even superficial attention, perceive some change in it, which will indicate the extent of oppression induced by this all-powerful and wonder-working cause the miasm, or other states of the atmosphere.

To shew that the skin does not become yellow solely from the absorption of bile I ask why it assumes that tinge in parts recovering from contusions. It is difficult to suppose, indeed, that bile is conveyed to this particular portion of the skin on purpose to give it the yellow caste, which is now so evident, without also communicating the same appearance to the healthy surface around the seat of the blow, and beyond its sphere of influence. These appearances are met with in every part of the body from contusion,—as the thighs, breast, back, arms, around the eyes, &c. If bile is not necessary to give this yellow tinge, which, I suppose,

every one will admit not to be present in such instances, I should say it is not actually requisite to communicate this appearance in other diseases; and that we must therefore look to the nervous power of the part alone, or perhaps to the blood itself. The coats of the skin, from their own altered state, may assimilate from the blood this colouring material,—being now weakened in their powers, they may form the peculiar colouring matter, as I imagine that all secreting surfaces and vessels secrete different fluids according to the state of health or derangement. This is also rendered highly probable when we consider the debilitated state of the extremities of the nervous system whether existing in part, as in contusions, or from the more generally operating cause which is present in all epidemic diseases. Bile, no doubt, may exist in the blood, but in those cases in which we know it is present, as in jaundice, we are well aware that it produces far other effects than in the fevers and other complaints more particularly under review. We do not see such high states of excitement take place in jaundice, even in intertropical countries, and I think a very fair inference is that it is not productive of the yellow fever, or even the yellow tinge in the skin, at least in the great majority of instances: bile, however, when circulating with the blood, either produces disease of another description, or aggravates that in existence, it may, therefore, be looked on as a foreign ingredient, which, when present, may excite at any time the disturbance to a greater pitch. In the case of contusions, however extensive they may be, we see that this does not occur, and if not in contusions why does the bile require to be present in other diseases, in order to impart a yellow hue to the skin? This appearance may, from a deficit of power in the nerves of the parts,

or whole body, pervade the entire surface ; and we know that various tissues in the body are capable of assimilating to themselves certain qualities from the blood, according as their nervous power is in an excessive or defective state of action—under the particular circumstances of health, disease, or the vicissitudes of climate,—such a conclusion is by no means unreasonable. I do not, however, choose to prosecute this important subject, but now leave it with the distinct inference that bile is not necessary to give the skin this yellow tinge, that, when it is present in the blood, it in general excites much disturbance in the general system, or in particular parts of it ; and also that, when such appearances as those above noticed do occur, the nerves of the surface, or of the whole body, are suffering from a deficit of action, as in cholera, or an increase of this perhaps, as is occasionally met with in yellow fever.

That the bile when in excess, and even acrid, as it has been termed, should be a general disturber of the operations of the system need not astonish us, especially if we reason according to the opinions of most of former days,—this the more particularly so when we know that it is not an unfrequent attendant of sporadic cases of Cholera even in India, but perhaps more particularly in Britain, in the hot weather. I am at liberty to ask a question and it is, why should bile, when a *little* changed, so stimulate the intestinal canal, through which it daily passes the more particularly as it is an inmate in the parts themselves? One would be apt to conclude that this, as a general cause in the production of many diseases, has been conceded. The intestinal tube, in so far as it is individually or identically concerned, has as little to do with it as any other part of the system ; and although it transmits the bile, yet this last does not act detrimentally upon

the tube but upon its *sentient* power, and therefore the nerves being irritated or disturbed, it is no wonder that we should have such varied features of disease even as these exist in dysenteries, fevers, or cholera, which occur according to the peculiarities so often pointed out, as those of season, and the different circumstances under which the sporadic cases, and not such as are epidemic shew themselves, as well as the peculiar nature of the reigning complaint. From the above, we may gather the reason why acrid and non-acrid bile may be a cause of disease;—but that it is a general one cannot be admitted even for an instant. There are other causes to be taken into account, as well as the acrid nature of the bile, which operate not exactly in the sameway, but all of them upon the nervous system, producing the vast variety of fevers, and other diseases so frequently met with. The cause or causes, however, producing them being removed, it does not as a matter of course follow that the disease will cease, or the symptoms be even moderated, since the impressions being once made, they will remain in operation until either the powers of the system, or those of medicine expel them. It is one thing, therefore, in the treatment of such attacks, to remove the cause, and another to take away the disease induced. We need not, therefore, be astonished that either a purging, or vomiting, should continue in other disorders, after the ejection of the offending materials, which have been the cause of the whole; since the impression made on the extremity of the nerves may remain for a length of time, and even become deeply fixed in the system, by inducing such a change in the condition of the parts as may be favourable to its continuance.

But to return from these degressions, which I am obliged every now and then to make, for the purpose of

having every thing connected with every part of the subject completely and at once before us, I now observe, as respects the depressing passions, that very many medical men have observed that those of the mind, however caused, are a strong incentive to the operations of Cholera. If we look into the various complaints which may be classed with it, or which depend on morbid matter for their presence, we will find that depression of body and mind, either as arising from the state of the atmosphere, or from any other source such as bodily fatigue, will all have a powerful and extraordinary influence in bringing into speedy operation the over-powering one, so frequently alluded to, in very many instances : or, if it has not been as yet admitted, the very presence strongly pre-disposes the body to its influence. The disease may, in certain cases, be said to produce its ravages on the constitution accordingly, and this may even be one reason why the strongest constitutions suffer, since, although their bodies may be powerful, they require as powerful a supply of nervous energy for their support as others do under other and opposite states. The more firm and resisting the mind of our patient is, for combatting impressions of this nature, so much the more chance for him, either in guarding against disease, or giving a more powerful resistance to it when formed. It therefore, follows, that we should encourage all our patients, during epidemic seasons, as much as in our power, even those who are not suffering from them. But after doing all that in us lies, we will find even the stoutest hearts give way to an almost uncontrollable depression of mind,—particularly during the prevalence of a severe epidemic. It is not the courageous or more than brave, or the coward, who can escape this sort of calamity ; since man, however formed or steeled for fac-

ing an enemy, or any other danger, before him will sink at the approach of disease. Does the above not shew that the operating cause of cholera, and other epidemics, exists in, and depends upon, derangement of the sensorial powers, and that the operating influence of the attack makes its first impressions entirely on the nervous system, and that it is in this way that man is *robbed* of that stability and firmness of mind, which so strongly characterise the bold and undaunted under other circumstances however appalling;—but here is a cause by which he is shorn of it even independently of himself. Many instances could be adduced in corroboration of the above, such must be familiar to every medical man—I pass them over on this account.

Some have been of the opinion that certain other conditions of the atmosphere, independently of those already stated, have to do with the production, and are the real cause of the epidemic cholera. We must now turn our attention, for a short time only, however, to the examination of the subjects of electricity, the productions from earthquakes sol lunar influence, &c. Mr. Orton has struggled hard to shew that the grand and overwhelming cause was owing to a deficit of electric matter in the air; but, it is believed, had he directed his thoughts to miasm, as occurring under the different states mentioned, and which I will yet further illustrate, that he would have been much inclined to have admitted the sources already advocated, as being the fertile cause from which the epidemic springs. He says that “it has been shown that the attacks of the epidemic are accompanied or immediately followed by rain, cloudy and moist states of the atmosphere, thunder and lightning. or light winds; and from these circumstances it is likewise *inferred* that they are also accompanied

“ by a depression of the barometer.” This statement, so far as it goes, is certainly correct, and he has been at considerable pains in collecting facts as given by printed reports, and from other sources within his grasp at the time ; but I must object to his inference. The facts he has distinctly stated, but his deductions are at variance with those advanced ; although, be it recollected, they are drawn from facts ; before I enter on the subject which I shall do in as concise a manner as is compatible with the nature of the enquiry, it will be as well, as has been formerly done, to commence the subject with a quotation, since such a method serves as a sort of wedge to open the way. The paragraph is from a published report transmitted to the Madras Government in 1811, as to the cause of an epidemic fever which prevailed in a certain part of India. “ What was particularly observable in the
“ state of the atmosphere at this time, the period too at
“ which the epidemic raged with the greatest violence
“ was a *denseness* in it, sometimes almost creating a difficulty of breathing, a feeling we had occasion to experience about the middle of April at Dindigul : and we
“ learnt from Mr. Hepburn that at Tinnevelley it was
“ equally remarkable and distressing. There was
“ besides, during these months, a *singularly oppressive*
“ *and steamy vapour, which rose from the ground*, and
“ which gave a sensation not unlike what is occasionally
“ experienced from a crowded assemblage of people in
“ hot weather”—“ The districts are in many places
“ marshy ; and much rice is cultivated in them which
“ requires to be kept under water. They are bounded
“ on one side by the western Ghauts, the great line of
“ mountains which runs down the whole peninsula, and
“ on the other by the Bay of Bengal. Those parts which
“ are situated on the sea coast suffered least, and those

“ next the mountains were particularly affected. It was
 “ the opinion of the Natives that the disease was owing
 “ to the mountains. The villages which were situated
 “ *near marshes suffered excessively.*” I am under the
 necessity of introducing for the elucidation of this sub-
 ject a number of quotations, since one man’s observations
 and experience cannot afford an insight into the whole ;
 therefore at times we must cull from others, but this has
 been done in as limited a degree as possible, and wher-
 ever met with, and passed over without any further com-
 ment, they are to be taken as if they were my own opini-
 ons. That the Natives were not very far out in their no-
 tions, as to the mountains being the cause, or having some-
 thing to do with it, as well as the marshes, will at once
 appear from what I have stated already ; but more parti-
 cularly when we consider, what is narrated as regards
 the mountains on the Island of Ceylon, they will, as a
 matter of course, prevent the *free* circulation of air, and
 the putrid particles must accumulate near their bottoms :
 and although the places were not in a *stagnant* state
 with respect to their circulation, yet they were not
 so well ventilated as they would have been, had there not
 existed this cause of obstruction : consequently there
 must be, for a greater or less space of time, an accumula-
 tion of the *materies morbi* engendered, and this is always
 apt to be increased by the large forests and impenetrable
 jungles in or near them, as well as the marshes. This
 then is not electricity, and it will appear more evident
 from the sequel. The testimony of the compilers of the
 above report, who, it does not appear had any theory to
 support, shews that the people near these marshes suffer-
 ed most. It is well known that on the Island of Ceylon,
 the winds are prevented from having their full sweep
 across the country, from the very high mountains that

intersect it ; for, when it is the healthy season at Trincomallee, it is the unhealthy one at Colombo, which is on the opposite side of the Island, and in an oblique direction from the former. This chain of mountains prevents the wet and moisture in the one season from passing them ; when it is therefore the wet portion of the year at the one place it is the dry one at the other.

Mr. Orton says, “ the epidemic Cholera has been frequently found to precede the falls of rain while the earth was still parched with draught. Nay, so far from the rain being a cause of the disease, it is a very general, and I believe a just opinion, that it actually tends to destroy not only this but other epidemics. Several instances have been already related where the disease disappeared on the occurrence of heavy rain succeeded by fine weather. It appears therefore that of all the atmospherical phenomena which have been mentioned as accompanying the disease, none are universally present except those which indicate a diminution in the density of the air and a *tendency to rain and storms.*” I have already stated what my opinions are, as regards the appearances which occur during the prevalence of heavy rains, and some other particulars : I now go on to say, that it has been supposed, as above stated, that the general cause of Cholera depends on a tenuity of the atmosphere, with a diminution of *electric fluid* ; consequently, it may be supposed, that the air abstracts this from our bodies, and that in this manner the nervous power is impaired. This appears curious indeed, in particular when we observe the epidemic as prevailing along a wide range of sea coast. The supply of this deficit electric fluid, even if it did exist, could be surely easily accounted for on other principles than by

supposing that it operated on the body in the way referred to, this could surely be supplied from the waters of the sea, since they must always tend to keep up an equilibrium in the state of the air, and clouds, by supplying the deficit when required. Thus, by restoring a proper quantity of that electricity to the clouds which we know takes place in the ascent of water into the air in the phenomenon of the water-spout, they will prevent our poor bodies from being acted on by this as a cause. A most distinct appearance of the above phenomenon was observed by the Officers and Men of His Majesty's ship *Melville* when on the passage from Bombay to Madras in March 1834. The funnel appearance was most beautiful and distinct, in short it was one of the most perfect representations of the kind that could possibly be seen—so distinct as to resemble a well defined drawing on paper. We were within a very short distance of it,—it certainly did not exceed a mile, at all events so close that some imagined they could distinctly trace the water ascending from the surface of the sea; at the place where the mouth of the funnel appeared to be attached, there existed an evident depression, or pit-like appearance; the supposed ascent of the water, for we had no other proof of the matter than that afforded by the appearance, could be traced to a large, heavy black cloud which hovered at a considerable distance above. There was also a peculiar, and rather remarkable appearance traceable along the whole extent of it, the funnel, which was larger at both extremities than in the middle, had also a well marked and near resemblance to the flame proceeding from the top of a burning brick kiln, in a cool, dry, and dark night, when the greatest proportion of the smoke has disappeared; this continued for several minutes. But to return to the subject, even admitting

for a moment that a deficit of electricity were a cause of the disease, the following questions of importance occur—Is the human body capable of parting with its electricity supposing that it possessed much of it under these circumstances? Would the parting with it produce the appearances met with in the disease? Would the breathing of air deprived of the greater part of this subtle fluid induce an epidemic? Can the body give out electricity, as above stated, without a conductor intervening between it and the air? Besides, what is to prevent the earth from imparting electricity to the air, and thus saving our poor frames from being deprived of that which, at best, is a very conjectural cause of the disease?

To enumerate the various causes which arise from earthquakes, and the other inexplicable phenomena, which attend convulsive struggles of nature, during these periods, would perhaps be superfluous. I have, however, to observe that, although from such concussions there is something given out, at times, which proves extremely detrimental, yet we cannot admit it as an all-powerful cause of Cholera. It has been stated that every place which suffers need not experience the shock, but the reason why, in so far as I am aware, is not given; therefore we are yet left to find our road in the dark, as to the manner in which this deliterious principle travels, and to rest contented with what investigators of these phenomena state as to the fact of severe epidemics occurring about such times;—if we are to look on plague as one, then this has on many occasions occurred at or about the period when the shocks have been felt; from this we must certainly admit that there is something noxious emitted from the earth. This of course shews that there is a something *added* to the atmosphere, detrimental to human existence; and the occurrence of epidemics might be accounted for, even in

those places where the concussion is not felt, on the supposition that the noxious materials were propagated through the medium of the atmosphere, and in opposition to the prevailing winds, as already stated. From the above, then, may be drawn a most important inference in support of my theory, that there is a something noxious given or added to the air, which of course was not previously in being nor could possibly be, in any other way, *so long as the diurnal revolution continues*. But that earthquakes, or the productions of them, are to be looked on as the general cause of Cholera, seems preposterous in the extreme, especially when we know that the disease has prevailed in *all* countries, without the presence of any such phenomenon occurring at the time, or perhaps for years before, and that when such does take place it is not necessarily followed by disease, although the complaints arising from such should be greatest, one would think, at the place where the shock is most powerful. Even admitting that earthquakes were the grand cause of epidemics, why do we not find this extending along the whole *line* in which the concussion is experienced, and at *once* making its attacks in several places simultaneously. Nothing of this sort has ever been observed in any quarter of the globe, else we would have had many parts severely and repeatedly attacked by pestilences, and even the *whole* of India must ere this have been, at one and the same time, attacked with Cholera, if such owed its presence to this as a cause. But as nothing of the kind occurs it is but reasonable to conclude that, although an earthquake may be present at the time a particular disease appears, it will surely cease to operate as soon as this is absent,—this the more especially when the disease has been in a manner once extinguished. Nothing of this has ever happened in India, for we see

Cholera almost yearly raising its savage head, destroying thousands, breaking out in places that have never experienced these shocks at all, or at any rate not for a great many years,—moreover, that the epidemic at first occupied one year in travelling over the whole of the continent of India. Some may say that the earthquakes do not, at all times, give out this noxious material, or at least not along its whole line of march; I think from this it seems evident, and necessarily follows, that there does exist another general operating cause, and that this depends, in the manner stated, on the nature of the soil, and on the woods and jungles, &c. and that this noxious principle is capable of being produced every year, according to the season, the climate, and the other varying circumstances attending its presence.

The appearance of the cholera has been ascribed to sol lunar influence; and however Medical men, at Home, may be inclined to deride the opinion, that this is an aggravation of disease there, yet, in India, we have more to do with the notion. I shall only attempt however, to refute the opinion, that the existence of the epidemic is dependent on this as a cause; I at the same time, admit that it may possess some power over certain other diseases, or on the constitution of man. If cholera depended on the motions of the moon and the other heavenly bodies, why does it prevail incessantly for months in India?—nay, its very continuance from year to year would lead us almost at once to give the negative to the question. The difference existing between places attacked, and those suffering at the time, although not removed far from one another, so far as the latitude and longitude are concerned, seems to shew that such cannot operate as a cause. If, as imagined, the disease owed its existence to this, why have we a particular district or

village attacked, and these not many miles distant from others equally populous and under its influence. Why does the disease continue its depredations during a whole period of the lunation, without abating one iota of its virulence; this runs counter to the opinion of Mr. Orton who supposes that the cholera is more mild at two periods of the moon, as between the change and the full, but it is not invariably the case, for we will find the epidemic more severe or mild, according as the weather is good or bad, or approaching to the interval between the two periods, for reasons sufficiently obvious. Besides, if such were the case it would only shew the moon's influence *over* the disease, not in *producing* it. Why does the disease play its eccentricities in the division of an army by only attacking the centre, and leaving the wings free, or by attacking one of the wings, and leaving the other two divisions free. The above I expect cannot be satisfactorily explained on the supposition of sol lunar influence being a cause of the production of cholera; it, however, admits of the easiest possible explanation on the supposition of the miasm as arising from the soil, or the other sources mentioned. One part of the camp may be situated on soil which parts easily with these noxious properties, and the other not. This is the reason why it shews itself in the particular quarter in the first instance, and, in proportion to the tendency of the soil to part with these noxious ingredients, under the various circumstances of moisture, dews, &c. so will the liability increase. As the diversity of soil in all quarters of the world is great, and this too even at very short distances, the same field or place of encampment, for example, may have a soil possessing a multiplicity of properties,—one part of it may be marshy, or may indicate the remains of a marsh, by being spongy to the tread,—it

may be clayey or of a more imbibing quality,—it may be rocky, sandy, or the like;—all these things therefore making a difference of such importance as to be regarded strictly in the selection of ground proper for an encampment, especially at particular periods of the year, when we know that an epidemic is likely to break out, in the district in which our army may be desirous to encamp. The moon has certainly a powerful effect over the inhabitants of our globe, and the diseases with which they are assailed, and as it is also wonderfully manifested in the production of the tides of the ocean, so it may certainly have a corresponding influence over the air; but I have already shown that neither its density nor its tenuity can avail much under these circumstances; but that it has a manifest effect on some of the diseases of India most men will admit, who have seen much of intermittent fevers there, particularly those of long duration, and cases of lunacy, or such as approach to it. I knew a Captain in one of the regiments belonging to the Bombay establishment, (and such cases are by no means rare) who had an attack of fever every month, and this had occurred for several years; the paroxysms were always greatest when the moon came to her full, and the intensity of the symptoms decreased as she diminished in her last quarter. I also know an officer, in His Majesty's service, who has, since being in India had much mental aberration about these periods. He is teased, fretted, and uneasy, a little before the change and full, but when that takes place the appearances give way to more outrageous acts; and, in defiance of his better principles, he is very apt to quarrel with almost every one that comes near him. This species of lunacy is of the *knowing* sort, since most, who are under its influence, believe themselves excessively clever

and shrewd, when labouring under the hallucination. Independently of all these considerations, I cannot admit that the moon exerts any influence in the production of cholera, since we meet with it at every period of her age and proceeding, independently of her increasing or decreasing, according to the state of the weather. In so far as the moon's influence extends to the regulation of the weather, I would agree to the supposition that it has some power over the disease. It is therefore over the state of the weather, in so far as this may be wet, moist, or dry, and not to any specific influence it exerts alone even although barometrical changes do not point it out, so far as refers to the tenuity of the air, or a deficit of electric matter. Under the last mentioned circumstances, we should certainly expect a great and overpowering disease to be produced by the sudden falling of the barometer, as we know takes place before hurricanes in many places of the world. We may meet with it falling more than an inch in a few hours, as has often occurred at the Mauritius, immediately before the bursting of storms, which prevail there in resistless fury,—yet no epidemic has manifested itself. In fact, the place remains healthy. I must, however, state that, after the last hurricane in 1834, there was much chin-cough amongst the children.

I could enlarge much on this point but the instances adduced, will, I trust, be sufficient to account for the non-interposition of sol lunar influence, deficit of electricity, or tenuity of the air as being influential in the *production* of any epidemic. In fact, when such are prevailing the hurricanes in general make them more tractable, particularly after these have expended their fury, so long as the weather remains clear and dry; when not so, the

noxious particles are not so rapidly carried off as when it is in a contrary state. If sol lunar influence had to do with the production of disease of this class, why should we not have it existing in every part of the world, and to the same extent, in many places where causes are favourable for their production, I mean as regards the state of the weather, this we know is not the case even from the earliest accounts of some of these places :—if we take the Mauritius as an example, we know that the disease did not shew itself to any extent there, before 1819. From that period to this, it has never prevailed as an epidemic, although a few solitary cases are occasionally met with in the summer season ; these are, however, mainly attributable to the other sources from which I have stated the disease in question may arise,—such as eating indigestible substances, shell fish, the climate or malaria. Here then, as we have seen above we have the epidemic introduced in the first instance into the island—and I would now ask why it has not continued to prevail if it depended on sol lunar influence or a tenuity of the air, since there are few places where the barometer changes so much in a few hours ? As this, however, is not the case here, we have little hesitation in rejecting it as the cause of cholera, in any other part of the world. Sol lunar influence is a very convenient way of accounting for the rise and spread of such an epidemic as this, for it certainly does depend greatly on the state of the weather, and it must occur during some period of the month, as is evident enough ; none however, can tell that it is in consequence of the moon's influence that the disease is produced. If we divide the quarters of the moon's age, we will have three and a half days on either side of these points, then there comes to be a clear short space which may either be free or the reverse,

until we approach within a few days of the change or full. Now I repeat that this is a very convenient way to account for the presence of the disease ; but as we know that it often gives premonitory signs, for a few days, before it breaks out, by an irregularity of the bowels, and if we calculate from these appearances, we shall have it prevailing both under the influence of the full and change, or in the other quarters, although, I believe it has been said, that the attack prevails with more virulency at the time of the full. It is imagined that the supposition is nugatory and fallacious in the extreme ; although a convenient one perhaps for the purpose which it serves, I cannot admit it as in any way connected with the production of epidemic cholera.

That cholera depends on the same cause as other epidemics, will appear evident when we consider that in those climates, in which the disease more regularly shews itself at certain periods of the year, we have either dysentery, intermittent fever, cholera, or many others. One of these diseases predominating over the others. I think that this distinctly shews that the same cause determines, or brings into operation, the whole of them, as it may be in a major or minor degree of concentration. Do we not observe even during the prevalence of cholera, bowel complaints, or fevers, and this the more particularly, towards the close of the reign of the severe epidemic ?—these things occur even when the cholera suddenly disappears. From hence, I would draw the inference that the greater the concentration of the miasmatic or morbid principle, so much the more severe will be the leading or reigning disease. We see therefore, now, that the weather has much to do with this as a cause. It is no argument against the opinion that the same kind of weather produces both these species, of disease. I answer

at once, and without scruple, that the morbid material from other causes is not present each year, to the same extent, and that the weather is not always the same, although apparently so, there being frequently some deviation the one year from the other. "I will mention" says Dr. Kennedy. "That in the province of Guzuratte, a regimental surgeon expects as naturally as he expects the change of season, that betwixt September and December, ten per cent of the men under his charge will be affected with fever, and that unless the season is unusually mild, an average not far short of ten per cent of those attacked will perish. Two kinds of fever are endemic in Guzuratte. From September to December intermittent prevail and in October we have nearly every fourth person disabled, but in the heat of April and May, when the thermometer in the open air is from 80 to 90 at midnight ! bilious fevers are frequent, and although not so generally prevalent, yet from their more virulent character, they occasion at least an equal number of casualties. But the usual average of deaths, always greatest at these periods, was increased in a prodigious proportion during the intervals, when cases of cholera were of occasional occurrence." From the above, as well as from many other sources that could be adduced, does it not appear evident to every medical man that the same cause is in operation for the production of the whole, and that it is only modified by peculiarity of season, and climate, the state of the atmosphere, and soil, and the extent of exhalation emitted from it?—hence we have certain states of these producing cholera, others causing intermitting and bilious fevers, or dysentery, and many other epidemic diseases. There is another point to be stated, which is that one of the diseases, although all

of them may be met with at the same period, generally takes the lead, and that the causes of cholera, operating in a minor degree, also give rise to the other diseases. I need not, in the infancy of the important subject, attempt any thing like a classification: were this to be done I would certainly place intermitting fevers, and dysentery far below cholera, as depending on the same cause; after this last I would also place the bilious fevers of hot climates, independently of their various names and varieties, as met with in different countries, for I still look on all as one and the same disease, only modified or increased by climate, age, constitution, and the different states of the patient at the time of attack, viz. whether drunk or sober, with many others. If the above be admitted it may go much further than, at first sight, might appear, for it bears on the treatment, as I shall afterwards shew. I now turn my attention, however, to some other peculiarities attending the disease.

It is very probable indeed that, during the continuance of *frosty* weather, diseases of an endemic or epidemic character should lose much of their virulence, or even entirely subside; and we accordingly find that they do so. If they continue raging in these circumstances, it must be owing to a quantity of unexpended materials remaining in the air, but under such a state of things the disease can never be so powerful as under other states of the atmosphere; nay the disease may be kept up from the crowding of many patients together. But that such should continue at any time of the year, and more especially in hot seasons, is not to be wondered at, when we consider that the dry state of the air, in excessively cold weather, is favourable to evaporation; and that this takes place in proportion to its dryness, so long as the surface of the earth is not actually *frozen*; at all

other times evaporation must take place, and will vary according to the extent of the dryness and moisture of the earth, or according to the heat and moisture of the air, this, however, is more particularly the case where the soil is moist. In this manner then, we may account for the appearance of the disease in all climates, however modified as to heat, cold, or moisture, so long as frost is not actually present. We will find the epidemic prevailing according to the constitution of the atmosphere, either as now, or formerly existing, and the disease, under these circumstances, must die away sooner or later than under any of the others. But if there be a thaw, so as to produce a new condition in the surface of the earth, or in the state of the air, then there is surely nothing to prevent it from again appearing, or even from spreading with renewed vigour; this it may acquire from a greater condensation of the particles,—or from an accession of others, favourable to its reproduction, which may have escaped from the immediate influence of the frost.

The reason why Cholera so often attacks soldiers on a march in India will appear from what follows. Suppose a battalion of men, for example, on its progress, from one place of the country, to another, and that when it arrives at the place of rendezvous, we find the disease breaking out only in one portion of the troops. “The rest of the cantonment” says Dr. Kennedy “enjoyed perfect health, though breathing the same atmosphere, drinking water from the same wells, and procuring provisions from the same bazaar; whilst the most unrestrained intercourse existed betwixt the infected battalion and the other two healthy battalions of the station.”—“Judge then my astonishment, at finding the battalion which I had seen, a fortnight before march from Surat, leaving behind the sick and invalids, in all the pride

“ and strength of perfect military efficiency, now almost disabled under the influence of the disease, in its most malignant form. The casualties being eight or ten daily, and one day fifteen out of a total below a thousand.” In the above quotation we have evidence sufficiently conclusive, as to the hidden nature of the epidemic, as well as of its non-contagious character ; even the author, from whom the above is quoted, seems, after this evidence, to believe in its partially contagious nature ; but more of this in its proper place. In the mean time I proceed with the investigation why such things occurred. The lands or soil, over which the battalion marched, betwixt Surat and Baroda—a distance of ninety miles—might certainly have been somewhat marshy ; or the night air might have been so cool and pleasant as to entice exposure to it ; it was “ rather cooler than generally prevails until January ;” this, when added to the deposition of moisture during the nights, and the fatigue of marching during the day, may be sufficient to account for the presence of a cause adequate to the production of the disease, even in the most formidable shape. The nature of the country through which they passed is not mentioned, merely, I suppose, from the plain reason that such, as a cause, was not admitted, or perhaps not so much as suspected ; at all events we are, left somewhat in the dark on that point. There is nothing, however, to forbid our belief that the soil is much the same as in other parts of India, and that, during a march of ninety miles, the men must have rested many hours at a time—that, while walking *early* and *before* sun-rise, they must have encountered the evaporation, as it rose from the surface of the earth, a point of much importance to be avoided, when it is possible, at all times, and, in particular, about the change of the seasons. That the disease must have

been contracted during the march, and that it owed its origin solely to this as a cause, there can be little doubt. How often do we find, in other parts of these territories, such occurrences amongst regiments on their way between different and distant places. The men, therefore, may be attacked on the line of march,—many will shew symptoms of a premonitory sort, which, when the regiment arrives upon more secure ground, and in good weather, will in general disappear. Besides the above, there is the great liability of the men being exposed to pestilential breezes from the various sources so often enumerated. From hence it follows that no regiment should be removed, at the particular periods of the year, when these prevail, unless under circumstances of the most imperative necessity;—such removals should take place during the most favourable period of the year. It is not surprizing, therefore, that in many cases the disease should remain dormant, or in a latent state: until the men arrive at the end of their journey, for the liability to the attack may have been contracted during the latter period of it, with as much probability, as at its commencement. It has been already stated that the miasm, under certain states, does not generally shew its effects sooner than a week after exposure to it. Sometimes, however, it shews itself more quickly, and at other times at a much later period. On one occasion, when the Cholera was raging amongst the 78th regiment at Trincomalle, the *Melville*, did not suffer by any means so soon as the regiment;—she was attacked many days after, although, he it recollected, she was exposed to the winds that blew from the shore, from which she was distant about a mile, and the men had very little intercourse with that part of it where the disease was prevalent. That sea-

men, under these circumstances, should not suffer so severely as those living on shore, or even have the same liability to the disease, is not to be wondered at, since the latter are constantly exposed to all the causes producing an epidemic, in a much higher degree, than the former. The weather was at this time close, and hazy, with *occasional* showers, both during the day and night, and rendered more sultry and oppressive on this account, than it would otherwise have been, had the weather been clear and dry, as it is frequently found during some part of the month of October. In fine, then, after reviewing the circumstance that many regiments are attacked on their marches, I am fully convinced that it is principally owing, if it is not solely to be ascribed to what has been now advanced ; and it is supposed that it may, on minute enquiry, be found the *sole* cause of the most sudden and unexpected attacks. This cause will continue to operate so long as the men are exposed, and even continue for some days—perhaps to the extent of two or three weeks after the termination of the march—although the epidemic seldom remains longer than this period, and is more frequently of much shorter duration :—it may run through the whole of the men who have been similarly exposed,—committing greater or less depredations, according to the extent of exposure, and the strength of their constitutions. It would be singular indeed, did the disease continue longer than the above period, since it depends in a great degree on the state of the weather ; so that, whenever it becomes fine and clear, we may expect, as indeed we shall find, an amelioration of symptoms. It is an incontrovertible fact, that strangers to a climate, are always more predisposed to its diseases, than its native inhabitants. It may also follow that persons, for example soldiers, who

have been long stationed in one portion of a country will, to a certain extent, be affected by the slight variations which occur—this too, will sometimes be the case even in the same district, although they may have been inured, in some degree, to the general character of the climate. The circumstance, therefore, of passing, from one district of India to another, at a distance from it, will not unfrequently be attended by consequences similar in kind, although less in degree than those which affect strangers on their first arrival in the country. The same sort of liability would even attach to the natives themselves, but still in an inferior degree to any of the former cases, if they were required to change their habitations : we would find that they would become predisposed to the diseases of that portion of the country to which they had removed, and this to a much greater extent than the original inhabitants ;—these things depend on many causes, one of which is the difference of soil. They may therefore not inaptly be compared to certain species of plants, which grow well in one soil, but which will not thrive and bear fruit in another, although apparently under precisely the same conditions in both. Strangers, therefore, are always more prone, than its native inhabitants, to the diseases predominating in any particular country. This liability to be attacked will wear off, in proportion as their constitutions become inured to it, with other evident causes, which it is unnecessary to mention.

Upon the general principles hitherto advocated, we need not be astonished that Cholera, as well as other diseases, depending on this peculiar morbid material for their presence, should prove so resistless—for they generally have a fatal termination, on their first breaking

out, particularly the first named, when the epidemic is very severe. I should rather be astonished were it otherwise. It follows, then, *cæteris paribus* as to exposure, &c. that those first attacked must have the less resisting nervous system, and must consequently, by giving way sooner, afford little chance for successful treatment. The Cholera, in its progress, attacks those or reduced nervous power; perhaps it does this from the latent continuance of the cause wearing or exhausting this power, or from its becoming more concentrated. but, as it advances, it will require a stronger power to act on—and, in consequence of the superior resistance of that power, it will afford a greater chance of cure than in the case of those first attacked. It is also to be expected that, towards the termination of the attack, the disease should assume a milder form, since every one assailed must have a comparatively high degree of resisting impulse in his system; besides, the cause has greatly expended itself. Such a power of body, however, even in these circumstances, may be brought under its influence, by the operation of many other causes—such as great bodily labour, mental depression, and, in this way, the most powerfully resisting nervous system may be assailed. In this manner, then, I would attempt to explain the apparently anomalous circumstances, that the disease, at the outset, is more virulent and afterwards assumes a milder form. According to the above, which I believe is the correct view of the case, we find both circumstances most satisfactorily explained. It also serves to explain why the apparently stout man, as well as the more weakly, comes to suffer at a particular period of the attack. “On the first cases medicine seemed to have no effect;” we will have but too often to witness this, as well as the frustration of all reme-

dial measures, and the solution of the difficulty is given above. I now extract a passage with reference to those, the most liable to be attacked. "It was found" says Dr. Kennedy, "that the cases were by no means numerous, and occurred chiefly among the most depraved, of the most miserable poor. But although the epidemic was not carrying off its thousands, still the endemic fever, which always prevails towards the termination of the rains in Guzurate was singularly destructive." We may easily explain the whole of the above, on the supposition I have laid down, and they are also in unison with the views of the disease generally advocated; by these I can easily account for its sudden and unexpected appearance, as also its disappearance;—for we will, in general, find that it decreases in severity, with a return of fine weather, and a serene sky, and also that it will re-appear when the reverse is the case. It must, therefore, be sudden in its attacks in those regions in which quick changes of that nature are apt to occur,—particularly if attended by the other concomitants of the disease.

The Cholera, when it makes its first invasions on the human body, is not in general of such a malignant, and overwhelming nature, as, at once, to deaden the whole of the animal powers, or even the vital functions; it may certainly act as if it communicated a stunning effect to the whole system; and, in this way, in perhaps less than half an hour, it will reduce the powers of life to a very low ebb. This sudden impulse, however, may wear off, and even quickly, but it may leave behind the impression it has produced, which will continue, in full operation, or not, according to circumstances. This point may be illustrated by taking into account what occurs in the case of an animal knocked down in the

shambles, or in those states of concussed brain which are sometimes met with ;—in these we observe the whole functions of the body suddenly deprived of the support derived from the nerves. The animal, in this state, may either die, or speedily recover—it may become frantic, or confused according to the various causes in operation. Cholera, therefore, as it attacks the nervous power, may make a rapid invasion on the first assault ; but, for various reasons, which will afterwards be stated, it will not operate so quickly, as in the above examples ;—it may be of such force, however, as to overpower the whole of the nervous system, and thereby produce the shock of diminution ;—or, the patient may be roused from this lethargic state by the innate operation of some powers in his body producing a state of re-action ; and having thus recovered from the more immediate effects of the *first* impression, he will be apt to be assailed, in proportion to the suddenness, and duration of the operating cause, with all the symptoms of high excitement, or a diminution of action—The reason of this is that a person in *apparent* health, who has his various functions thus suddenly assailed, will, in proportion, experience their force, which may, *at once*, reduce him to a state of total insensibility, and thus, time not being afforded for a progressive reduction of these powers, they will, when re-action takes place, operate with a corresponding degree of vigour, or the reverse, just in proportion to the extent of the exciting cause, and also the suddenness of its action. In this case we suppose that the powers of the body are only, for the time being, dormant or suspended, and that these, when the oppressive cause, unless of too long duration, is removed, will, as a matter of course, re-act in proportion to their former condition, and the susceptibility of the patient for receiving

their impressions. Hence we may easily account for the great diversity of forms under which the disease appears when re-action takes place,—these being varied in proportion to the time the disease has been oppressing the system. Thus, to make use of a common-place expression, as applied to other matters, if it be allowed to personify the nervous system, it will have time to think in those cases in which the attack has insiduously and progressively advanced, but, on the other hand, in such as are sudden and unlooked for, no interval will be available for that purpose;—these impressions wearing off soon, will, when re-action occurs, operate with more impetuosity than in the other instances in which they have time to be either brought down to a corresponding degree of action, or in which their powers are exhausted, either from the duration of the attack or the magnitude of the exciting cause; these last will reduce them to a low state of sensibility. Hence follows an important point for our consideration in the treatment, as respects the administration of various remedies, especially those of a stimulating nature.

There is a somewhat curious circumstance which we not unfrequently meet with in cholera,—a very strong tendency to sleep or drowsiness on re-action being about to be established, or after it has actually taken place; this occurs after the termination of the more severe symptoms. Our patient is, as it were, in that sort of condition in which we find those describe themselves who have slept soundly in the first part of the evening, and had pleasant dreams:—he feels exhausted, but this is more a consolation to him, than a cause of annoyance or complaint. During this period too, the countenance assumes more of its wonted aspect, the secretion of natural heat, and the circulation, gradu-

ally, progressively, and sometimes flatteringly return : as the above takes place ; we may observe this drowsiness actually end in a sound sleep, from which the patient is not easily disturbed. This phenomenon is also an attendant on other diseases, besides Cholera ; we meet with it in epilepsy, and generally in apoplexy, after the more severe symptoms are yielding, and, in all the cases, this tendency to drowsiness, or sleep, is so intense that no disturbance annoys ; we will find that patients sleep soundly in defiance of almost every species of it. In all of the above diseases, the nervous power seems to have been, in a great measure, worn out, or to have its quota expended ; it will now rest itself, on purpose to be recruited. That this should be a natural consequence need not astonish us, since we know that when the severity of the symptoms are once mitigated, either through the powers of the body, or our judicious interference, it may just be in that state of existence either turning to health, or the reverse. Such a state may not be improperly compared to that which results to a person who has been subjected to severe labour during the day ; at its close, he is often in an exhausted condition, and instantly falls asleep : it may also be compared to the case of a person who has swallowed a considerable quantity of spirits during the evening ; he also goes to bed, and speedily falls asleep. All this proceeds from an exhaustion of a major degree of the nervous power. But let a man, in place of severe bodily labour, or of drinking intoxicating liquors, betake himself to walking all day—supposing him unaccustomed to this exercise :—he will thus produce an exhausted state of the nervous power,—at night he will feel fatigued and exhausted, especially about the usual time of repose ;—let him continue on the journey, he will expe-

rience the sensation of drowsiness, if he does not actually fall asleep on the road: after a time, however, he will be enabled to proceed with more vigour. During the intermediate state the nervous power is recruited, and no matter what length of time is required to effect this—whether it be ten minutes, or a few hours,—we know that it will be sooner, or later, according to the previous habits of the individual. Therefore, the nervous system being refreshed in a shorter, or longer, space of time, the other powers of the body will consequently be recruited in proportion. Some may think that in Cholera the drowsiness, or sleepiness, was owing to the medicine administered, but Mr. Orton states that “this remarkable
 “symptom does not appear to be chiefly owing to the
 “Opium which has been exhibited, for I have seen it
 “occur in an equal degree in cases where little or even
 “no Opium had been given. It happens at all hours of
 “the day and under all circumstances; even in the
 “midst of noisy and crowded wards, where exertions
 “are making to save their less fortunate fellow-
 “sufferers.” I can fully corroborate the correctness of the above, having not unfrequently met with the same occurrences in the course of my practise; this even on board ships, when I have found it difficult to arouse the patients to take their medicines. I think that, when this disposition manifests itself strongly in the system, it would certainly be a favourable time for the exhibition of a cordial medicine, although we should arouse our patients for the express purpose, of administering it; they would soon fall asleep again, and nature, during this period, might exhaust herself. The administration of any remedy, at this particular time, however, requires the nicest discrimination, as its propriety necessarily depends on a multiplicity of causes which

cannot be here investigated, and as we must be guided according to circumstances.

As the number of deaths, of daily occurrence in India, during the prevalence of this disease, is astonishingly great, little apology is considered necessary for our prosecuting the subject with a view to trace every cause, or feature connected with it; so that we may distinctly see to what point our remedial measures ought to be directed. The rapid fatality of the disease in the Island of Ceylon, is so well known that it requires no comment. Suffice it to say that it appears to have been equally so in some other places; persons have been known to drop down dead, while at their work. Nay, we meet with a statement in which the people were so suddenly assailed that they were tumbling over one another in the public streets. "At Punderpoor, 350 people are discribed to have died in one day tumbling over one another lifeless in the public streets, and the patients were knocked down as if by lightning." If this disease does not depend on deranged action of the nervous system, and, through this source, on a consequent derangement of the other powers of the body, I know not in what manner to account for the above occurrences; and here I may be allowed to observe that the grand aim of this essay is to establish this point, satisfactorily it is to be hoped, and that every thing which has hitherto been introduced on the subject, even from the consideration of the Conservative principle, goes to prove some lesion inflicted on this grand power. In addition to what has already been advanced, I still mean to illustrate the subject further, so that there may be no doubts on the subject, even in the minds of the most sceptical. I shall at present introduce another passage in which the extent of the ravages of the disease are pretty well marked. "In

" Calcutta it spread itself in the first week of September,
 " and each succeeding week added strength to the
 " malady, and more extended influence to its operation.
 " From January till the end of May it was at its acme,
 " during which period the mortality in the city was sel-
 " dom under 200 a week !" It is useless to observe that
 the disease has committed frightful depredations all over
 the world ; therefore, I repeat that we cannot be too in-
 timately acquainted with its cause, and the manner in
 which it operates on the human frame. If a more fright-
 ful picture of its ravages, than the above, were required,
 I would only adduce an instance in which it carried off
 3,000 in twelve days, and this, too, in the division of an
 army, some accounts state that the mortality, during
 that time, amounted to 5,000, others to 8,000,—the mean
 presents a frightful picture of destruction.

I should now proceed to the question of contagion, and
 a few other points, but will defer their consideration un-
 til a short recapitulation of my views of the disease as
 connected with the nervous system be given. Having
 gone over the subject, with that degree of attention
 which it undoubtedly requires, I now state that *epidemic*
Cholera seems to depend on a certain state of derange-
 ment in the atmosphere, however, this may be induced—
 that it does not appear to depend on electricity, solar or lu-
 nar influence, or any other traceable cause except such as
 emanates from the soil itself, and the other sources alluded
 to, which impart noxious particles to the air, and which
 are kept suspended or floating in it. I will again shew
 that these may emanate from the places in which a great
 number of sick are confined, when other causes are pre-
 sent favourable for *Cholera* attacks, but this point will appear
 more evident from what follows. It appears to me that
 the disease under consideration if not entirely, at least

in a major degree, depends on a derangement of the nervous system, which has been induced by the noxious substances stated. This derangement proceeds from the nervous, to the sanguiferous system, and ultimately through the entire body; and this we have seen may occur more or less rapidly, according to existing circumstances. Many, I have little doubt, will say here is the nervous system and atmospherical influence brought forward, things we can speculate on, but are so little acquainted with, that we proceed without any certain data:—granted—is there any one who would be inclined to make oath before any Judge that such states, as given above, are *not* present, and is that any reason why the disease may not be placed here as well as in any other of the various functions of the body? since we know that it must have an existence somewhere amongst them. I have stated that it would be folly to say, because such and such things cannot be proved, that they do not exist, and co-operate most powerfully in producing the complaint. Every one who has seen cholera, in its most malignant form, must have been struck with that rapid decline in the sensorial functions; in some instances produced almost as quickly, as the falling of a thermometer by a sudden removal from a warm to a cool medium, and in others, more resembling the short interval of twilight which occurs between the setting of the sun and the darkness that follows in intertropical climes. Whence, I ask, is that rapid exhaustion which takes place so quickly in the latter stages of the disease produced? Whence, in the same stage, proceeds that lethargic indisposition of the *sensorium commune*?—none need state that the faculties remain bright and entire during the progression of the several stages; if they do let them answer why a patient requires to be aroused to take

medicine, or to be spoken to, in the latter stage, when he comprehends with difficulty, perhaps not at all, the purpose for which he has been so aroused. Whence do all these things proceed? My answer is from a derangement of the nervous system. This may have its rise in their extremities, their origins, or ganglions, for each I conceive is capable of acting reciprocally on the other. Hence we have the action most probably emanating from the system itself, or entering it at the nervous extremities. The reason of the origin of the nerves holding out, or resisting longest, will at once appear, when we consider that the stimulus at the point must be the greatest, and consequently endure the longest; on precisely the same principle that water can be obtained for a greater length of time from the fountain head, than it can be from any pipe that may convey it from this source. The smaller branches of the nerves will be more easily paralyzed in their actions than the larger, and must suffer in proportion to the abstraction of this stimulus. I may now state that I view the nerves as a species of electric cords, but acted on somewhat differently from other electric conductors;—this may appear evident when they are seen supplying heat and other peculiar actions to the system. Such a method of expression being somewhat loose, I have to apologize in the words of an old and much respected lecturer when he had any difficulty in expressing his ideas. “Gentlemen this is from a poverty of the English language which prevents me giving my notions accurately on the subject.” Viewed, therefore, in the different lights mentioned, I think it may not be difficult to account for the various symptoms of the disease—why the heat of the extremities decreases,—why the circulation of the blood becomes languid, or totally lost from the extremities,

—why the loose, and why coloured stools appear,—why vomiting and purging,—why the other secretions unless those perhaps of the skin, &c. are diminished or suspended. I have little hesitation in stating that bile, so long advocated as a cause of the malignant form of the disease, is not by any means to be viewed as such, but rather that it comes to suffer in the same proportion as the other secretions. Some of the above points will fall to be considered under the description of the disease itself; in the mean time I go on to the investigation of the subject of the contagious or non-contagious nature of the malady.

CHAPTER. VII.

CONTAGION.

Here I tread on ground which must be gone over with great delicacy. As yet nothing of a *positive* nature has been advanced as to its contagious character. That it arises where no immediate contact can be apparently traced seems fully confirmed by an ample store of facts, which are to be found detailed in many valuable reports and treatises on the disease. I am well aware of its wildness and eccentricities, as displayed amongst the Indian troops, and in different parts of the globe, which leave us much at a loss to speculate with any degree of certainty or precision as to its really contagious character. I have felt much astonished at the mode of its attacks and the surprizing variety of the circumstances, as well as suddenness under which it makes its approach, and again disappears. Having fastened perhaps upon, and played its sportive fury for a while in the centre of an army, it would fly off to the extremity of the wings, and instead now of proceeding in the form of a continuous contagious disease inwards towards the centre, or as

might have been expected in the former instance from the centre towards the wings, it would all at once decamp, and, if possible with new eccentricity, find its way to the ranks of a far distant army. At times, a village, on the banks of a river, feels its scourge, and proceeding apparently thence into the interior, it deals its blows of death (as the term *mort de chien* seems to indicate this may be corrupted into a French term and be significantly enough expressed) and in this more natural procedure, so to speak, the physician would feel naturally anxious to arrest its progress ;—but finding it start up and display its havoc, as if from afar, he feels himself bewildered, and ready to yield to the common despondency, and can do little more than deplore the direful pest and scourge of his kind. The alarming and astonishing facts to which I have just adverted, first suggested the idea that the wind might be the medium of propagation, and I have endeavoured to point out why it proceeds directly in the *wind's eye*, to use a nautical term, which difficulty none before, so far as I am aware, have ever attempted to explain. Many will probably say that from the above statement their minds are perfectly made up as to its non-contagious character, and that those who advocate the opposite opinion must have difficulty enough to contend against ere they can be made to take an opposite view of the subject. From what has been advanced regarding the atmosphere, little doubt remains in my mind as to this being one mode of propagation. The disease is in action when this cause is present, and when removed the epidemic speedily ceases or loses ground.

I may now give my opinion as to how far the disease seems to be propagated by contagion ; and it may be

stated once for all that by contagion is meant infection, wherever such occurs, when treating of this subject. As to its attacking places, at a considerable distance from one another, and at almost the same period of time I have already accounted for that anomaly. Let me now ask what is to prevent the same cause from existing, at the same period of time, at each place. It must be confessed that I can see little to induce us to think otherwise. I now take up the complaint in its more malignant form, which may be aptly enough termed the Cholera gravidior, and this I consider under certain circumstances contagious, or more properly infectious, and to as great a degree as Typhus gravior. It is folly to imagine that this latter disease is not contagious under certain circumstances; and I must state that I have known very many fatal examples of it occur about Glasgow, from the years 1822 to 1826;—it is imagined that there are but few medical men there who do not consider the disease as certainly contagious or infectious under certain states as some of the exanthemata themselves. In regard however, to the more mild forms of Cholera, I believe that there is little of a contagious character about them and that it is only in proportion to the attack being malignant that we have to dread the disease from communication, even here certain circumstances are necessary for this taking place. It will be important fairly and clearly to state the facts on which this doctrine has been either asserted or denied because I am afraid that we would otherwise leave the question in that manner of doubt which in our present state of information very probably belongs to it. I cannot omit stating what has more immediately come under my own observation, but first of all be it stated that I use the term *catching-disease* as synonymous with the old term contagion, and

this last with infection. Although the difference between the two be great, yet it is not of sufficient importance to destroy the term chosen, and it is perhaps little to the present purpose whether the disease be communicated by the touch or by inhaling the same air with the infected; these are regarded, for the present, as minor considerations, and infection under all circumstances is considered the more appropriate term. I am as fully convinced that the Cholera is catching as that there are diseases of a contagious character, when the mind is strongly under the influence of fear, or dread of the disease,—when exposed much amongst the sick,—when the ventilation is bad, or in hot climates where the air at certain periods may be called stagnant, particularly when these circumstances are combined with inattention to cleanliness, and poor diet such as is used by the Natives. We are told that under certain circumstances intermittents are contagious. We have seen or read of cases of severe pytalism produced in patients who have been in the same ward and lying near to those who were profusely salivated, and who have not taken one particle of mercury, but merely caught the complaint in consequence of inhaling the tainted air. We all know the circumstance which occurred on board one of H. M.'s S. of War where a bag of quicksilver got loose in the hold; all were more or less salivated in consequence of the *vapours* of the metal rising through the ship. We all know that people unaccustomed to spiritous liquors, may become intoxicated, by inhaling the atmosphere of any place in which spirits are left exposed. I may now be allowed to state what came more immediately within the sphere of my own observation. I was on the 24th October 1832, left on board the *Arrogant Hulk*, in charge of some moribund cases of cholera belonging to a detachment of His Majesty's

78th Regiment at Trincomalee : 8 cases remained after the others had been removed to their own hospital, as many of the soldiers as the *Hulk* could contain were placed here, healthy and sick together ; this was only for a short time for the number of cases that now appeared and the deaths actually alarmed the officers and men. There were four of the soldiers left with me in attendance on the above cases as nurses, with an addition of six coolies. The eight cases died before six the following morning, and the four nurses were progressively laid up during the time. The coolies, although aware that a double hire would be awarded them if they exerted themselves, could not be got to go down from the main deck to the lower amongst the sick ; it was even with the utmost difficulty that they could be prevailed on next morning to aid in the removal of the dying and the dead. The Natives, every where around, would with difficulty and reluctance approach any place where they knew the Cholera existed. This may serve to shew that they have their own ideas concerning the infectious or catching nature of the disease, and although untaught, and unaccustomed to close philosophical reasoning, the fact is sufficient for us, and requires no commentary. To return from this point to the soldiers who acted as nurses ; one was the brother of one of those left first in charge, was most indefatigable in his attentions, and as anxious as any one could possibly be. He was the first to complain ; when he did so I thought he was intoxicated, but, satisfied that no spirits could be obtained without my certain knowledge I waived that idea at once, and merely state it as a most important feature of the disease,—many cases afterwards coming under my observation where the same appearances were exhibited when the patients first complained. About an hour

and a half after this man was laid up, another of them complained, the third soon followed, and the fourth was attacked in the very act of aiding in the removal of the dead. Two of these cases died soon after at their hospital, the other two (one of them at all events,) were, I verily believe discharged cured on the 7th November following; they were the only cases of recovery amongst the total, above thirty that had been attacked on board the *Hulk*. I had scarcely got on board the "*Melville*" ere an almost similar fate awaited me, and it may be here stated that not a single case of Cholera had as yet appeared, nor did it break out for five days after; I had not been on shore for many days previous to this attack when I was laid up for a couple of days. During this period I was anxious in the extreme, tried as much as possible to divert my attention from one of the most appalling scenes of human woe I ever witnessed in any one night, and I do not care how long the interval is ere it be again repeated. I was weak, languid and feverish for a few days after, this was not similar to the effect produced by over exertion, it was a something indescribably different from other febrile sensations and of which no correct idea can be given. Here I may introduce the copy of a note which was transmitted to the Colonel the next morning.

Sir,

I respectfully beg leave to acquaint you that out of all the eight moribund cases left on board the *Arrogant Hulk* I have not been able to save one of them. It was truly a heart-rending scene to witness the speedy and certain dissolution of them all. Seven of them died between half past six and nine the same evening. The other lingered on till five this morning. Three other cases of a slighter nature occurred amongst the four men

left as nurses and happy am I to add that two of them are now out of all danger, at least from the immediate ravages of this most inveterate and deplorable malady, the other was attacked about six this morning. About three A. M. a Corporal from the clock-yard party was brought on board very bad, and sorry indeed am I to state that very slight hopes can be entertained of his recovery.

I have the honor to be,
&c. &c. &c.

N. B.—The other man left out of the number of the nurses, is apparently about to suffer, he is languid, listless and drowsy. I have now come to the determination of sending them all from the *Hulk*.

I soon saw that there could be no chance for a sick man on board such a ship, where the air was stagnant, from being so closely housed in, and the place so much infected by the morbid materials which must have emanated from the bodies of the sick on the lower deck, especially when there was no circulation of air or to a very trifling extent, for the atmosphere was in a stagnant state during the whole of the night. All the others who were attacked were placed on the upper deck, at considerable distances from each other. I am persuaded that the disease is catching under these circumstances.

Lately in England the pratique laws were abandoned, and this perhaps for two very obvious reasons. The first from the ruinous effects their operation produced on our mercantile affairs, and secondly from the absurdity of having laws in force, as regards conveyance by sea, when at the same time communication by land remains uninterrupted. Supposing, however, that such intercourse could have been prevented, there is one point

over which our otherwise sanitary cordons could have had no controul, and this is the atmosphere. Sanitary cordons, in such instances, would be as useless as to set a barrier against the winds. I hope, from what has just now been advanced, that we will see the strict propriety of attending minutely to cleanliness, proper ventilation, with plenty of room, and as wide a spread of our men, or patients, as circumstances will permit—always keeping in mind that a ready access to the medical attendants should be afforded. If these things are overlooked the mortality will in many instances be much greater than it would otherwise be, for nothing is more necessary than proper attention to what may be considered salutary measures in this respect. I shall prosecute the enquiry, as to its really infectious character, a little further; in support of my opinion I know that almost all, if not all, the medical attendants at Trincomalee were more or less affected during our arduous duties, with pains in the legs, arms, and these severe in some instances, with other anomalous appearances. The pains in some were so severe as to require to be rubbed with some very strong liniment in order to overcome the spasmodic affections. These were very different from what usually follows excessive mental and bodily fatigue, for, instead of going off in a day or so, these symptoms kept about some of us for many days, in two instances upwards of a fortnight. In consequence of severe duty and exposure, when the disease again broke out in the “*Melville*” on the 29th October, I was a second time under the influence of the disease. Towards the subsidence of the disease on board, and when the men were convalescent, I was attacked with every symptom of the com-

plaint, unless the frequent dejections downwards,—the vomiting was but slight, but my breathing was oppressive and painful, my headache severe, with great languor and lassitude, spasmodic affections of the extremities with other attendants. My case was the Cholera sicca of Dr. Good and others, rather than the more severe form of the disease. Early the first night in the attack, and before the spasmodic affections of the legs had disappeared, when lying in my hammock I was on a sudden assailed with a most profuse perspiration of the right side, while the left was perfectly dry. This occurred after drinking a tumbler full of strong wine negus, exactly in the mesial line of the body, from the head down along the thigh and leg,—even one half of my nose was drenched in perspiration while the other was dry. I felt considerable relief on the side which was subject to perspiration, while the other remained as before. Being alarmed and somewhat astonished at this peculiarity, I tried several ways to get rid of it, but all to no purpose, for independently of every thing, it continued for more than an hour, when I think it was completely exhausted. How is such an anomalous symptom to be explained?

It is the opinion of some medical men that the disease is really and truly contagious; but they seem to lean with caution to it, and it is believed that they have not paid that strict attention to the division of the disorder into its different forms—as into the more benign and more malignant species—with an intermediate stage, which the nature of the subject requires. Had such been done it is imagined that they would have found reason to conclude that the Cholera was at least infectious under certain circumstances, and this the more particularly as regards the malignant state. It is at once admitted that the anti-contagionists take up a

strong position when they demand, in what manner, on the hypothesis of contagion, the disease starts up at so many different points at the same instant of time, as in fact to preclude the idea of its spreading, purely from contagion. I think that this question has already been fully answered, since it has been shewn in what manner the disease may gain ground, even in opposition to the prevailing winds, and that few things will retard its progress when there is a proper nidus for it ; these opinions are strengthened by our witnessing its assaults by sea as well as on land, even rocks and Islands, otherwise free from infectious diseases, cannot be exempt from this atmospheric cause of production. The disease may certainly attack those who are placed under similar circumstances, as regards diet and exposure. I know this, and admit it ; but there is another point for our consideration and it is, that the strength of the nervous system might be able to combat the present exposure, but when brought into a more contaminated air, as that arising from the bodies of the sick in confined places, I have little doubt that the disease may be often brought into operation, although it might otherwise have remained dormant, and may therefore be properly considered *catching*. Thus, although all exactly under similar circumstances be not attacked, yet I am confident that many fall victims to the epidemic from exposure amongst those who are assailed, where there is not the most rigid attention to cleanliness, &c. The strongest of the anti-contagionists cannot tell me the reason why many of those men who have undergone exactly the same routine of duty escape, and why others are assailed ; unless they grant that the power of the nervous system in one may be more firm and resisting than in another, and that

this may be the peculiar idiosyncrasy of constitution or pre-disposition of body, which too many have called a subterfuge from investigation. Without putting any questions to be answered, it is imagined that we cannot do better than consider the species gravidior as contagious or infectious, and as much so as typhus gravior, and under the circumstances supposed. Sporadic cases of Cholera, as they occur independently of an epidemic cause, may be regarded as only likely to prove infectious the more they are crowded together. I have stated that the Cholera is a disease that rages when the exciting cause is present, this being absent or abating, so does the epidemic obey the laws which substract the deliterious substances from the atmosphere. Instances of its sudden disappearance are by no means rare—resembling, in some degree, its sudden and unexpected attacks. It has also been stated that we ought to impress the minds of our patients with confidence, to separate them as much as possible so that they may not witness the havoc the disease may be making, when there are many of them crowded in a confined place; by so doing we will not only be enabled to prevent its spread, but a point of more importance is that it will inspire them with confidence, and relieve their minds from a powerfully exciting cause of the disease.

As to those who believe that the Cholera is, at all times, and under all states, contagious, we may derive much benefit by the examination of this subject a little further. In the prosecution of this I shall examine the merits of the case without being pinned to the faith of any doctrine. In the Madras Reports we find Mr. Kellie, writing as follows. “In observing the further
“progress of this dreadful malady, I am still more convinced in my own opinions, of its contagious charac-

“ter. Does not the strikingly characteristic symp-
 “toms, the uniform rapidity of the disease, argue to
 “conviction the operation of a peculiar morbid poison ?
 “How is this poison produced ? Is it generated in the
 “place, or is it brought into it ? If generated and not
 “contagious, its operation will be confined, within cer-
 “tain limits to that place, as it may be diffused through
 “the atmosphere, when it may indeed for a time float
 “upon a gale accompanying the seasons, or be somehow
 “connected with the meteorological changes : but it
 “has observed none of these, it has been carried in the
 “very face of the wind from village, to village, from one
 “military station to another, and in the very route of
 “troops ; from Nagpoor to Jaulnah, from Jaulnah to Ar-
 “ungabad and Maligaum ; from Aurungabad to Seroor,
 “and from that to Bombay. It has progressively visited
 “the different villages between this and Hyderabad at
 “which place two officers have lately fallen sacri-
 “fices to it, one had constantly attended the death-
 “bed of the other, and he himself was a corpse
 “within 48 hours after. And is not this contagion ? or
 “shall we be answered by the puerile question, if it in-
 “deed be contagious, why are not all equally liable to it ?
 “and why are not the medical attendants themselves
 “attacked ? This knot is scarcely worth untying ; we
 “may cut it at once : we are all liable to it and attack-
 “ed whenever exposed to the poison, sufficiently strong
 “to act on our constitutions, which may be prepared by
 “various and imperceptible pre-disposing causes. Why
 “does vaccination so often fail ? and how did the whole
 “world escape the plague ? I would answer the above
 very pithy paragraph by substituting infection for conta-
 gion. I certainly think that the disease is produced
 from the operation of a “peculiar morbid poison” but

that it is never communicated by touch alone as emanating from the body of the patient, but is caught by breathing the atmosphere in which it first originated. Much confusion has crept into medical reasoning by introducing the word contagion when infection was certainly meant; nothing more need be added in the present case than that it is my firm opinion that this is an infectious disease, and that the infection is produced from a variety of sources;—but having already entered most fully into these points little more remains than to give an outline of this part of the cause. It has been shewn that, in the *Arrogant Hulk*, at Trincomalee, I had every reason to suspect that infection was the cause of some of the cases which occurred under my own observation, this chiefly arose from the confined air of the place, and the noxious particles which emanated from the bodies of the patients themselves. Let us once have the peculiar constitution of the atmosphere, which I have alluded to, introduced, and we cannot say when this will abate; it may not do so until a return of clear and dry weather. I have no doubt, under the statement given, that the breathing of persons afflicted with the disease is capable of imparting this poisonous quality, in some measure, to the surrounding air, and, if this be not speedily carried away, that it may infect others who are pre-disposed to the disease, either from the fear of catching it, or from their constitutions being at the time, on the balancing point between health and disease,—this, however, as a cause, is much less frequently met with than the general prevailing one in the atmosphere itself. We have gained so much by considering the disease as not by any means contagious that we can go near our patients with more safety and confidence; particularly when we know that there is a free circulation in the air around them,

and that their places are clean, this is a point of the greatest importance to be observed in the treatment. The Madras Report states “ the perspiration, or moisture is “ often free from odour, at other times it has a fœtid, “ sour or earthy smell which has been said to be peculi- “ arly disagreeable, and to hang long about the nostrils “ of the by-standers.” This peculiarity of smell I have also observed, but could compare it to nothing with which I am acquainted; some one says that it resembles that arising from quickly sawing through a fresh bone ; this certainly gives the nearest approach to it, and being accompanied with a peculiar coldness of the breath, which is not unfrequently met with, seems to impart a deliterious quality to the atmosphere.

I have stated that the disease is so rapid in its attacks, in *all quarters* of a village, that by starting up in them at once it entirely precludes the idea that it is of a purely contagious character—does it not therefore follow that it cannot be propagated solely in this way. But, that the Cholera depends on a poison imparted to the air, there can be no doubt, this the more especially when we observe other poisons producing the exact phenomena either in a major or minor degree, as in many cases of this epidemic. It is to be hoped that we shall no longer hear the question why all who breathe the same air are not assailed, this question has been already answered. I have also endeavoured to shew that the poison imparted to the air is of such a nature that it may be termed a poison *suigeneris*—that, in proportion to its strength so will the disease be in intensity or *vice versâ*. Even the operation of this has been stated as depending on individual peculiarity, not only on the constitution of the patient, but also of the climate, soil ; as also the circumstances under which he has been for some time previous.

It is stated that an endemic or epidemic disease never advances progressively like a contagious one. This I believe to be true, and that wherever our infected atmosphere is, there also will the disease shew itself; besides, the air of an infected place is more likely to call into activity that of another quarter in which this might have been just approaching to the very point of becoming an exciting cause, but wanted an additional impulse or a something to stimulate it into activity. Let us, for the sake of illustration, suppose that the cause producing intermittent, or bilious remittent fevers is present, then by a Cholera atmosphere diluted as it may be from another source coming across it, we have an amalgamation of the two, and now in all probability the presence of the disease. The intermittent atmosphere itself might have possibly done so in perhaps a few days more, had the weather become very close and sultry with much moisture in it, either falling in the shape of rain by day, or dews by night. This closeness and stillness of the air, will not only cause a condensation or concentration of particles, but a more abundant evaporation during a lucid interval of the sun's beams. In this manner would I account for the presence and spread of the disease over our Indian territories, and in other parts of the world, whether hot or cold. Even on the hypothesis of contagion, purely such, it is scarcely possible to account for the very rapid spread of the disease, and that it should have visited, in the space of one year, such a large quarter of the world as almost every corner of the east Indies, and elsewhere. Is there on record any other contagious disease that ever did so, where even the line of human intercourse was as little as it is at present in many parts of India? Is it possible to conceive that the distemper could hang about travellers without attacking them? and we well know that Cholera is a complaint

with which there is no travelling when once under its powers, down we must stoop, and live or die a few hours: many perchance decide, nothing of this was ever known to occur, unless amongst our troops, and it is well known that they, in the years alluded to 1817 and 1818, did not travel with the disease *all over* India, but were attacked on their marches, when the places they left a short time before had remained healthy, thus evidently shewing that they must have caught or contracted the epidemic on their journey. If not in this manner why did it not attack the other bodies of men whom they had just left? or why in some instances were the first named assailed while those on the march escaped? None of these points are to be satisfactorily explained on the principles of a purely contagious disease. We see it alive in several parts of India at one and the same time, attacking villages and camps in all quarters of the country; they are *at once* under its influence,—the distemper leaving these places as suddenly as it had assailed them;—this too as it would appear under circumstances in which no communication existed, or of such a partial nature, as to preclude the idea of its spread being owing to this as a cause. Thus then the Cholera progressively advanced, in direct opposition to the winds in some cases, forming to itself laws of its own, and peculiarities which do not depend on contagion:—but that each of these several causes and places labouring under its influence was dependent on the state of the soil and atmosphere for their presence of this there can be no doubt—at least there is none in my mind. Here then we have an evil demon on its march, sitting on the clouds, or emanating from the earth and, as it were, *feeding* on the places through which it passes—maintaining its own independency, setting defiance to a clear sky and fine wea-

ther, and determinately keeping up a degree of vigour sufficient for its maintenance, and like Pharoah's lean kine consuming everything within its reach.

The atmosphere like other fluids and gases may be only capable of containing a certain portion of foreign materials and thus it will especially in intertropical climes, soon arrive at a saturating point, the rest of these noxious ingredients not being able to ascend will remain at the surface of the earth, and, as it were, watch an opportunity of doing so when the others are dissipated,—they will then come into circulation and full play : they in their turn will be carried off, and this will be repeated so long as the generating power remains in operation. It will easily be seen that the earth cannot always continue to give out such materials, and that there must be a time given to enable her to recruit her powers ; this, may take place next season or not, according to the previous state of the atmosphere, whether it has been wet, dry, or moist, &c. and in this manner the cause will be modified, either as it is capable of producing Cholera or the other complaints classed under this head ; this also in proportion to the marshy texture of the soil, or the thickly wooded country, or the high mountains intersecting it, and the other causes already stated, according to the stagnant nature of the air. In no other way can I account for the variety of appearances to be met with, or the fantastic shapes which the epidemic assumes, except on the supposition that this as a cause, operates on the body, through the intervention of the nervous system. Who has ever heard of plague going the rounds of the Globe in so destructive a manner ; it also seems to depend on a cause of its own, one *sui generis*, which is modified or aggravated according to certain peculiarities of air, climate, and temperature.

Plague was formerly believed to be a truly contagious disease and may be so even in the present day: but we never see it advancing any great distance from the place where it first appears, either in the more hot climates or in Britain,—it frequently requires season after season to do this. Who has ever heard of small-pox, or some of the other exanthemata, spreading so far and wide in such a short period; yet we all know that these are contagious diseases, and some of them highly so. They have been and are now prevalent in some parts of India, but they do not spread so fast, even in the line of human intercourse, although they are more capable of being carried about than the epidemic Cholera. We never see a hawk, or letter carrier, communicate any contagious distemper with such rapidity as the cholera proceeds and this is one of the great means of communication between many parts of India. Even admitting every thing favourable for the truly contagious disease to be transplanted, it will always take an *interval* of time to show itself, after exposure to the source of communication; such is always certain in its operations—evincing a uniformity of symptoms peculiar to the nature of the disease, the constitution attacked, &c. Cholera does more of these things but makes its way in defiance of contagion; moreover, we never see a contagious disease cause death so speedily as we witness in many cases of this. I believe that truly contagious diseases are by no means to be dreaded so much as endemic or epidemic ones, these latter appear without any *hitherto* known cause—and they as quickly leave the place. Contagious diseases never do this with the same regularity—it is not in their *nature* so to act. We are again compelled to look to something else as a cause; this we will in all probability find to exist in that already stated,

—in no other way are we able satisfactorily to account for the unusual phenomena to be met with :—from hence we may safely conclude that it is an infectious, and not a contagious disease, and that at times it is capable of being brought into action from mere accumulation alone, when the state of the atmosphere is such as has been stated. We might have reason to congratulate ourselves were it really and truly one of this number, for no contagious disease ever committed in such a short space of time so much devastation on the young and old of both sexes as Cholera.

The rapid fatality to be met with in cholera,—the striking resemblance, which exists between its symptoms and those cases in which poisons of certain kinds have been administered, would lead us irresistibly to the conclusion, that there is a poison existing somewhere. That all the poisons under consideration, operate on, and through the medium of the nervous system primarily, I have no doubt, and in proportion to the dose, so the rapidity, as also the severity with which they will produce their effects. Arsenic is so peculiar in this respect in producing symptoms of an analogous description, that even the Doctors of the Law have had to contend with the symptoms arising from its administration, and those of cholera ; when the decision has been given in a very suspicious case in favour of the latter disease, upon what grounds it is not necessary to enter : this occurred in Britain many years before the epidemic shewed itself. The opinion of some medical men then was that the operation and symptoms of the two complaints, were so much alike that the difference was not at all perceptible. The bites of snakes, as well as of some other reptiles and insects, also produce effects somewhat analogous to many of the symptoms of Cholera. View-

ing the epidemic as depending on a poison engendered in some way or other from the soil, &c. and imparted to the air we may derive some benefit as to the treatment. Is it not therefore likely that phosphorous may be highly beneficial; and it is believed, as I shall afterwards show, that if we could safely administer it in a hot climate or elsewhere, that it promises much, since it seems to possess powers over the nervous system as well as the circulation which no other known remedy has; but this falls more properly under the article Treatment. There is no disease (unless perhaps the solitary instance of tetanus) which we are acquainted with, that produces such sudden death as cholera. In the space of half an hour perhaps, the whole nervous system is so far reduced as to be beyond the power of recovery, although our patient may *exist* for four or six hours there-after. The damage is done, however, in a few minutes, and the symptoms resemble those above mentioned. The coral snake of south America, when it bites any person, causes almost instant death. He who is so unfortunate as to be bitten by it, as report goes, almost instantly swells up, and *blood oozes out at every pore, the veins are so turgid with blood* in some instances as to *burst*, when the *miserable* expires. The coya also, an insect of south America, is of a very venomous nature more particularly in San Juan de los Llanos and in the plains of Aciva and of the same shape and size as that in Europe named *Cochinella* de San Auton. This insect neither stings nor bites, but if it should happen to burst, and its blood touch any part, except the soles of the feet or the palms of the hands, it is said to produce *violent and often fatal convulsions*. From the vegetable world I shall select one instance amongst many that could be adduced. The Hiarree a tree growing in Guiana,

which is rarely found growing amongst other trees, is so strongly imbued with poison, that if accidentally burnt, a person breathing the atmosphere tainted with its smoke or fumes is often killed by it. Every one knows that smoke from the burning of badly dried wood is, noxious to the eyes : but, it would be useless in the present place to trace out the cause of these phenomena ; it is imagined that they cannot be satisfactorily accounted for in any other way than by supposing the system to be affected by a cause operating on the nervous communication which ramifies so abundantly in every part of the body. Even admitting that the blood may be the *first* part assailed, yet, as it depends for its existence or vitality on the nervous power, it will in a very short time affect the system, and in this manner the body is robbed of the principle of life. There are many, very many examples of poisons acting in this manner, but as they must be familiar to most of the profession I shall adduce no more than such as will point out the great analogy which exists between the symptoms of the disease and those arising from the class of poisons referred to. I leave this part of the subject with the thorough conviction that the operation of all of them can only be explained on the idea that the nervous power is principally concerned, and that it is through this alone that the whole of the over-powering depressions can be produced. In drawing a conclusion to the above, and previous to taking up the subject of inflammation, or concussed brain, as a cause of cholera, I cannot omit stating that there seems to be an evident disregard for medical opinions—the reason why, I cannot attempt to state, but it may be proper to attend to the fact. Society has certainly not arrived at such a pitch of high knowledge as to be capable of taking

within its grasp the whole range of philosophy—such cannot be acquired by light reading, however extensive that may be. Rapid as the march of the intellect has been, I cannot but believe that in the present day there is too great a degree of superficial *polish*, which is neither permanent nor deeply fixed—a very little rubbing does away with the whole, leaving the great bulk of the fabric to be wrought again by the stern and determined enquirer, who can unriddle the whole of its formation and put what polish he pleases on it. Such general enquirers therefore as may attempt to legislate on medical subjects, however high their standing may be, must in very many instances be wrong. The medical man becomes inimical to such, from the very circumstance of pointing out their blunders. The spirit of freedom, where it exists, is so manifest, that man alone with this in his brain will conquer all difficulties, here is one however, the cause of cholera brave as he may be which none can contend against, and one that is daily gaining on us and may perhaps for ever bid defiance to our efforts of subduction unless the proper measures be taken to uproot the evil; this I have shewn to consist in clearing countries of their superabundant woods, draining of marshes, paying proper attention to the culture of the soil, &c. There is therefore no dependance to be placed in the opinions of any man who has not devoted his life to such pursuits, especially as connected with medicine; and he who attempts under other circumstances to deliver laws or opinions on this, or that subject, connected with the profession, must always be stamped in the minds of the well informed as an *ignoramus*. Medical men are disliked in a great measure from their being the only people perhaps who are capable of investigating the true laws, which govern the animal œco-

uomy, and on which a strict legislator on the animal machine will always frame his *caveats*. Hence the good liver, the spendthrift, the night reveller, the debauchee with a host of others of the same class must of necessity be generally inimical to those who point out the rocks upon which they are apt to be lost. The very presence of the medical man, after a night's carousal, puts the irregular liver forcibly in mind that he has broken through and neglected much of that salutary advice formerly given, he is a mark of dread and awe to such ;—hence the impression descends through the long and lengthened chain of society. This is only a general illustration of the subject, and I might now turn my attention to climate, but there is another point which must engage our attention, enough being already stated on the former.

C H A P. VIII.

INFLAMMATION AND CONCUSSED BRAIN.

Many have supposed that inflammation of the bowels, the brain, &c. is a cause of the epidemic, or is produced by it and is in existence during the progression of the disease. I trust it will be satisfactorily shewn not only in this part, but also in that of a contrasting disease Tetanus, that inflammation is not a cause and is not generally present during the progress of this in almost any case. Upon this depends a question of great importance as to the propriety of abstracting blood in the *general* treatment of Cholera. I may state as a rule for our guidance that there can be no inflammation without some degree of action above the standard of a healthy part ; reduce the action in whatever way we like, still there must be an action induced of

greater power than the part itself is possessed of. It follows then, that where there is no excess of action there can be no inflammation, especially under the circumstances in which our patients are assailed, for although there may be an excess of action produced in the general system, yet it is expended there, before the intestines, stomach, brain, &c. are attacked. We see this varying however, in a multiplicity of forms from the lowest grade of human existence to its highest pitch of health; but mark, this is only in particular parts, where we have the other functions going on properly, and as it were fully, even weak as they may be,—this as regards a stout and robust man, in comparison to a weak one; since both have a species of existence commensurate with their powers, what would tell forcibly on the former, would have no effect on the latter, merely because his nervous system is more firm and resisting, consequently capable of opposing such impressions. That inflammation, especially in the more severe cases of Cholera, cannot occur, either on the first impression or during its progress may at once appear, when it is stated that the system is too weak, and too much engaged to pay attention to this act, which may be looked on as trifling in comparison to the other, which is of such an universal nature as to engage the whole of the active operations of the body, so that no other action can be got in being until this is expended;—this is shewn by the symptoms. Such then may be looked on as the case during the progress of those attacks which act speedily, but when re-action takes place if the system only rest a short time, then, and not till then, have we inflammation present, or liable to occur, and this in proportion to the increased activity of the parts in returning to their natural and healthy state. Now

at this particular period those places may be assisted in the production of inflammation in a variety of ways,—one of them is by the stimulus, which the internal organs receive from the preternatural distention of their blood vessels or their excretories; for they are now so distended and numerous as to act like foreign bodies. This very state of the distention of the blood vessels may wear off or be induced in proportion to the slow or rapid return of their nervous power, which will tend to stimulate too quickly these vessels and parts. Appearances on dissection may be brought forward to corroborate the opinions formerly entertained as to Cholera being an inflammatory disease, at all events that the patient has died of, or with an inflammation existing in this or that viscus. I say that such appearances as shewn on inspection only demonstrate a distended state of the vessels of the part, with perhaps an infiltration of other matter into their substances, and that as yet there is no actual inflammation present. But let me have fair play in these instances, and let those cases only be selected in which the disease has been speedily induced and has quickly terminated, or those in which the distemper has proved fatal from the primary attack, not after the reaction has occurred, for on inspection of the vast majority of such instances, we will find that there is a new state of things present, different from those existing in the first instance, I refer for a further and more explicit elucidation of this subject to my essay on dysentery, because it is but imperfectly sketched here. At present therefore I will only state a point of importance that we will require to watch with the greatest care those cases that have got over the primary attacks, since we may find that their convalescence may be attended with many untoward

symptoms, particularly if our patients have been saved in consequence of the administration of powerful stimuli; not but that there will be found a considerable difficulty in those cases which have been saved by other measures. For we will find under any form of treatment that during convalescence there is a great tendency to diarrhæa, dysentery, and liver complaints; so that the danger is great, and our efforts must be proportionally so, since we may find that state in some more troublesome to manage than the cholera attack. I am happy to say that this state is less likely to terminate fatally; and I am also perfectly well aware of the rapidity with which some patients recover, this too without any outward symptom,—the recovery being as quick and remarkable as the invasion was sudden and unexpected.

I think it extremely probable indeed that the distended state of the blood vessels takes place in the manner elsewhere alluded to. This congestion is no doubt very frequently present, and I can only properly account for its presence on the supposition that the nervous power, at first being in excess, called into play the vessels of these parts, and the heart, being for a time increased in action, sent the blood through them more suddenly and forcibly than would have been the case, had the blood remained on the surface of the body. The nervous power, however, being now assailed, and suddenly oppressed, falls quickly below par, and leaves them as foreign substances, the moment re-action comes on, which, as shewn above, may be a cause, and I think a strong one, in the production of inflammation. This may also serve to explain the turgid state of the liver, spleen, veins of the stomach, brain, or other internal parts, with the consequent presence of black blood, which they invariably contain.

Such may serve for an explanation of many occurrences to be met with in other diseases besides cholera, and I imagine that in almost all such instances the distended state of the blood vessels arises from this, as well as a languid state of the circulation, allowing the blood to stagnate, as it were, in the more internal parts. Thus, the nervous power being withdrawn in a great measure, is a primary cause of the distention, but as yet we see no actual inflammation in existence, therefore I have said that we must have action above that of the former healthy standard before this takes place. Besides, in proportion to its subduction, or remaining energies so will we have a nearer approach to increased action of the parts, or a decrease of such must necessarily exist. If cholera be an inflammatory disease, why do we not see the blood drawn exhibit the marks of inflammation which it generally does in other attacks similar to those last supposed? The conclusion is that this must be a new sort of inflammation—one *sui generis*, or a different disease. That the blood never exhibits the buffy coat in cholera of the true character has been witnessed by all, and therefore it must either have lost the power of taking on such an appearance, or the conclusion is that this epidemic is by no means of an inflammatory cast. If the advocates for inflammation bring forward pain on pressure, as a diagnostic mark, this is easily refuted, since such indicates nothing else than a partial increase of the sentient power; and inflammation has not as yet had time to occur, for in no case from such causes does inflammation so speedily ensue; I know instances, from other causes, in which it is produced very quickly—in the course of a minute or so. The indication in such, when pain is present, is pretty evident on pressure,—our

object should be to moderate this action as much as in us lies. Can we suppose for a moment that an inflammation of the bowels can be the cause of Cholera? I ask in what cases of inflamed intestines did we ever witness such severe symptoms as those exhibited in cholera, do we not find that patients will live many days in the state?—nay, I will even admit the intestines to be in some instances gangrenous, yet even here we know that none of the more severe symptoms of this disease are ever shewn, or does death even take place in such a sudden and apparently unaccountable manner. No such things are ever seen in cases of inflammation of the liver, or any of the other large visera, or even in most cases of inflamed brain; all of these diseases continue for a considerable time, and give us some chance of curing them. This is not the case with cholera, for we must be very sharp with our remedies, else we run a great risk of losing our patient, and in proportion to his, or our delay, so does the danger increase. The most convincing proof of all is that many patients have died of cholera, in whom no inflammatory appearances were met with, at all events to the extent sufficient to account for the patient's death. I think therefore that the above reasoning is as conclusive as could be desired. It is therefore necessary that we should turn our attention to a something else as a cause, for we need dwell no longer on inflammation, which I have shewn cannot be in existence, unless in those cases in which *re-action* of the whole functions has taken place, or in which the nervous system has not as yet suffered severely, for in them we may have an irritative action approaching to inflammation and which as action increases, may actually end in this. Much advantage is to be derived in the treatment from a proper consideration of the above principles, as will be afterwards stated.

Cholera has been conceived to be nothing more nor less than concussion of the brain. But although some of the symptoms of the epidemic resemble this state of the brain, yet it is no more concussion than it is an inflammation of the urinary bladder, but let me not condemn without a due investigation. I shall introduce a quotation from the author of this theory, on purpose to shew that I have not been deceived. Dr. Kennedy observes, “ I consider concussion of the brain *to be the disease*, how induced I know not ; following the above inexplicable shock sustained by the constitution ; and the collapse and spasms to be symptomatic of the disorder of the brain, and finally, I consider the purging and vomiting to be no part of the disease, but the struggle and effort of nature to relieve the constitution, and cast off the noxious principle which is destroying it.” Now, although concussion of the brain does certainly resemble the more aggravated forms of cholera, yet there is a most material difference, for this resemblance does not hold good in all or even the majority of symptoms. I only therefore ask if any one ever witnessed a case of the more severe form of concussion of the brain present the same routine of symptoms as that met with in Cholera ? Did any one ever find that in the very first stage of concussion, when the pulse is fluttering, &c. that bleeding, before re-action had come on, is of any service,—but, when employed, did the patient not sink the faster ? I believe that every one will demand, as our author does of others the “ *cui bono* ? ” ;—from viewing the disease in this way, I answer him in his own language, “ for there will be little advantage in knowing the cause of an epidemic, when the knowledge thereof

“ will neither remove the effect nor heal it.” Such then is the language, seemingly of despair, which is held forth to us, but the most of men, although they may in part, and in part only, coincide with the apparent accuracy of the above remark, will however not act up to this, but such will only stimulate us to redouble our efforts. Concussion of the brain, it is imagined, implies a sudden disturbance of its functions, by some mechanical injury, which *at once* reduces the whole body to a state of insensibility, from which our patient gradually and slowly recovers: he generally does so, however, when proper precautions are taken. We must therefore look somewhere else to discover the hidden secret. Of Dr. Kennedy’s treatment I will elsewhere give a summary, which I think very applicable for the less intense forms of the disease. I now go on to observe that, did such a state exist as is here supposed, we must in general lose the whole of the more aggravated forms of the disease. That the *shock* to the nervous system when cholera is about to shew itself, is not capable of doing this, or of producing a concussed state of the brain, will certainly be evident to every one, who has witnessed the more severe forms of each, for, in the latter instance, there is a great prostration of strength without any shock being felt or complained of,—in the former such takes place instantaneously. A shock of the system differs from excitement, or the symptoms formerly mentioned, in this, that there is a rapid diminution of the powers from a cause or causes present, to which it can be traced. I only take this into account so far as regards external injuries. Now in cholera we observe nothing of this state produced. Although a person may die from concussion alone, yet we will generally find that there is *compressed* state also present, as evinced on dissection.

on, by the distended appearance of the blood vessels ; but if our patient dies from mere concussion, then we in general find an ex-sanguineous state of the brain,—nothing of this last is in general present in cholera ; the symptoms of the epidemic more resemble a compressed brain, occasioned by a distention of the blood vessels, and, if Dr. Kennedy wishes it, might be more properly called compression, since the symptoms in each come on *seriatim et gradatim*, in the generality of cases. In a concussed brain of a simple form, the patient may be for a few seconds or minutes stupid and insensible, but he very soon recovers without any treatment. Now there are few cholera cases that ever got well, or at all events so speedily so, as in the above instances ; relapses in cholera generally prove fatal, especially if they occur after re-action has been with difficulty established ; the slightest disturbing cause will make the patient fall back into that state from which no medicine will recover him. If such occurs in a concussed brain, it is from a different cause than the mere state of concussion, for we will find it now proceeding from compression, or from the actual state of the over-loaded blood vessels of the brain. It is no wonder that we meet with some of the symptoms of cholera in a concussed or compressed state of the brain, since all of them depend on some power operating against the nervous system,—each, however, producing actions and results on the body peculiarly its own. It may appear useless to notice that, in cholera of the more aggravated forms, we have the most severe spasmodic affections present, as also a vomiting and purging of a materies *distinctly* different from what takes place in either of the two former complaints, in which this vomiting and purging are altogether wanting, unless under certain states of re-action.

There is in general at the first an intelligibility of the countenance, as also a rationality of mind in cholera, which does not exist in either of the injuries alluded to. In many diseases attended with spasmodic affections such as in epilepsy, &c., can it be said that such occur in consequence of an accumulation of blood on the brain? thus depriving this organ of its powers of action, and inducing a deprivation of the nervous power of the whole body. In those cases in which we know that this occurs the spasmodic affections, if any, are very slight, and these symptoms may depend entirely on the extent of the compression from whatever cause: when this is slight, the convulsions or spasmodic affections are strong, but when more extensive, then they are more moderate or not at all observable. There are two conditions of the brain in which the convulsive actions are present, either in a high or low degree according to its condition—as from its being slightly or greatly injured, thus shewing what every Surgeon is well aware of, the extent of the injury. Cholera depends on none of these as a cause, but there is an accumulation of impure blood in the vessels of the brain, in consequence of various changes now induced; this, then, is the cause of the resemblance of the symptoms; it also serves, in some measure, to account for the languid and inanimate appearance so often portrayed in the countenance, especially towards the termination of the disease. We know well that the brain depends, for a proper performance of its functions, on a regular supply of pure blood. Now what let me ask does the venous congested state of the brain indicate? Does it not shew that there is an inadequate circulation, without the proper stimulus being afforded from the otherwise well purified blood, and that this venous blood renders the

actions of the part in a manner insensible ; besides, we know that blood greatly deprived of its oxygen will in some instances destroy life ; at all events it renders the action of the brain, sufficiently torpid and inactive, as to require some time ere it is again properly stimulated even after re-action takes place when the blood becomes a little more pure. In proportion as this state takes place, so will we have the various symptoms induced, which have been mistaken for concussion. I conclude this with a quotation from the author of the above theory and many may think that it is sufficient. “ The authors, “ as is generally the case with theorizers, shew “ themselves talented, but of active, lively imagi- “ nations, too intent upon a distant object to examine “ correctly the fore-ground of the argument ; yet their “ pages are rich with valuable matter, relative to the “ history and character of the epidemic.”

C H A P. IX.

TETANUS AND CHOLERA.

In support of my opinions, that it is derangement of the nervous system which is the cause and chiefly predominates in cholera. I propose to take a rapid view of one disease, which in many of its symptoms bears a strong resemblance to that under consideration. I select one of the most strongly marked in the class neurosis, tetanus, whether as occurring more frequently in intertropical climes, or more rarely in Britain. Tetanus therefore, or any other violent convulsive disease, may be regarded as having the same origin, viz. in a derangement of the nervous system from the operation of some peculiar cause ; for, be it now stated, there are many

which produce convulsions,—we may induce tetanic symptoms by administering to an animal *nux vomica*; cholera symptoms have been induced by eating shell-fish, and various others, especially when out of season, and we have heard that the eating of the *muræna major*, or conger eel, at times, produces symptoms of cholera. There are two species of tetanus which fall more immediately under our notice, the acute, which manifests itself quickly after the injury has been received, and may carry off the patient in a few hours, there is one case on record in which this happened in a quarter of an hour from the occurrence of the accident; it may last however for four or five days. There is a similarity in this respect to some cases of cholera, in which the patient may be carried off much in the same space of time. Tetanus may occur under any circumstance of climate, it more frequently, however, attacks the wounded and such as are exposed to the cold chills of night, in those where the heat is oppressive during the day. It may rage even as an epidemic without any assignable cause, as we learn from the French accounts, for it has been seen to prevail in Paris carrying off a vast proportion of the children attacked. Tetanus does not always manifest itself in the same regular manner as to its mode of invasion, neither does the other disease, the reasons for which shall be soon adverted to. There is not unfrequently an uneasiness at the pit of the stomach, with a strong tendency to spasmodic action in some of the muscles. The pulse is not, by any means, a sure criterion by which we may judge of the real danger of our patients in either disease. The pulse in some instances in each, during the paroxysm becomes accelerated but, after the severe exertion it becomes feeble, although not invariably so. There is this difference in cholera of

the more aggravated forms that the assailing cause is seldom if ever mitigated during the whole attack until reaction comes on, and it does not therefore shew such regularity in its paroxysms as is to be met with in the other. The reason of this is that there is an action induced in the one, somewhat different from that which takes place in the other, but each operating in its own peculiar way through and upon the nervous power. In tetanus, the extremities sometimes become *cold* even during the paroxysm, or they may on the other hand be attended by an increase of *heat*. The patient may be deprived of the power of breathing, for a time, or he may die during the continuance of the fit, or, the spasms may wear out the powers of the system gradatim,—every succeeding one rendering the system weaker, this should be a general rule for our guidance in each disease—to attempt the subduction of them by remedies best calculated for effecting it, without interfering too much with our other indications. The stools, if passed, are frequently of a frothy and yellowish, sometimes blackish appearance, the reason why, will afterwards appear. Now we observe the most of these symptoms present in cholera, and, in proportion to the severity of the attacks, so will we find that the dejections alter to a more thin and congee sort of consistence, such, however, is not so likely to take place in tetanus. Some have said that derangement of the alimentary canal is the chief cause of the latter complaint, and it is so when it occurs without wounds; although this be a general rule yet like others it has its exceptions, for we will find the cold chills of the evenings, especially in hot climates, and along the sea coast, capable of doing this, without any apparent disturbance of the bowels; such I apprehend takes place from a disordered action in the extremities of the nervous system, propa-

gated to their origins. Although we may mitigate the symptoms by a strict and proper attention to the state of the bowels, yet the cause being induced the disease will continue. This derangement of the digestive apparatus is more likely to occur amongst elderly people, and infants, or those of delicate constitution, than in the opposite, so also we find that cholera *chiefly* attacks those of weak nervous energies. In wounds, however, this derangement of the bowels may not take place until the tetanic symptoms have been in existence for some time, therefore they are not necessarily the *cause* but they are disturbed by the *effect*, so in cholera may the same occurrences take place. Now, in the above enumeration, there are very many important points to be attended to, and we will find that there is a great resemblance between them, and cholera, not only as regards the spasmodic affections, but many others. We may mark also that, in proportion to the severity of the attack, so the effects produced on the respiratory apparatus, and above all let us mark the changes which are produced on the pulse and state of the blood; all these evidently and distinctly pointing out the derangement that exists in, as well as the influence of the nervous power on the animal œconomy. Upon what do these symptoms depend? Is it from inflammation arising in the injured extremities of the nerves of the part, or a disturbed action thereby communicated either to the spinal cord or to the brain? or do they depend on some peculiarity of action induced on both these parts, either as a primary or secondary operation, and without inflammation? Whatever this derangement may be, I do not by any means say that inflammation of these parts, will cause an action like the present, although perhaps, in some few instances, it may. But I do say that an injury of a

nerve will, under certain circumstances, such as climate &c. produce in these two grand reservoirs, an action which we cannot at present explain, nor can such be detected, after life has become extinct. I by no means wish to say that tetanus is cholera, or a variety of it; but the illustration of the one may tend to throw some light on the other, and it is thought goes far to establish the opinions hitherto advocated, as to an evident derangement of the nervous system, being the grand cause of both. I am the more inclined to hold to this opinion when I observe the bowels capable of producing this, independently of wounds; and these last inducing an evident derangement of the alimentary canal. There must therefore be a something introduced into the system, causing cholera, and it is no matter whether this enters the general storehouse by the lungs, or in any other manner. None believe that inflammation of the nerves, or this in any other part of the system, is capable of producing cholera. We are well aware that the nerves for a long time resist the inflammatory process, and that this cannot therefore be induced at once or so speedily as we know cholera occurs. We see the nerves strongly resisting this action in dysentery, even when ulceration of the bowels is present, and until all the other parts are sorely and deeply engaged in the disease, this, even in the more severe cases, until a short time before death, perhaps only a few days. Even then, under such circumstances, if the nerves inflame, we cannot have spasmodic affections to the extent supposed, or as might be expected, for the obvious reason that the powers of the system have already been *gradually* expended. From this it follows that there must be an evident difference as respects the extent and force of the spasmodic actions either of tetanus, trismus, or cholera, whether as attacking a stout and

robust patient, or one who is of a weakly constitution, or those who have been long harrassed by previous disease; for each will have a variety of these spasmodic attacks according to the frame of body. In the second example, or that of a weak man, as yet unassailed by any complaint, we must recollect that the system, under such circumstances, is much more *powerful* than in the latter examples, in which these powers have been day by day brought down to a low ebb. Therefore, if inflammation does actually occur, under such a state as exhibited in the third instance, the system I may say is not disposed, from its debilitated state, to take on this action to a great extent. Some have stated that inflammation primarily attacking the spinal cord is the cause of the tetanic appearance, but we do not in general meet with inflammation of the brain doing this. It must therefore depend on some specific action induced on their extremities, or branches; and this too, is often produced without leaving any trace of its presence; since we do not see any thing like a severe tetanic affection from cases of inflamed nerve as arising from other causes,—at all events we do not generally meet with such. I do believe that inflammation, as occurring in the more internal parts of the body, requires some time, ere it can be established, and that there are always some symptoms present from which we may say that such is likely to occur; then such depends on certain states, whether it will turn out an inflammatory attack, or the reverse. I know well that inflammation can be *at once* induced, by chemical or mechanical injury, as I shall afterwards shew in my Essay on erysipelas, but even, under these circumstances, this is purely a nervous affection from the very first.

The above is pointed out with the view of directing our attention to a point of some importance; it is, that

when we ascertain that inflammation is about to take place, we should, by all means in our power, attempt to check it, during the interval of hesitation, if the expression be correct ; this interval of hesitation will be at the very onset of the disease, and *before* the action has permanently established itself, either in the system or the parts ; after this, it becomes a question of some moment, by what means we are to attempt to treat the case. This will fall afterwards to be considered under the head of Treatment. Our attention in tetanus is to be directed to controuling the nervous power, whether this consists in raising or depressing it ; and no matter how this be done so long as we overcome the existing state of irritation;—the same applies in a great measure to cholera. I draw the inference, from what has been stated, that, in most cases of cholera, and in very many of tetanus, there is *not time* for this real inflammatory state of the bowels, or the nerves to exist, and be shewn on inspection. Nay, in the last mentioned disease the blood when drawn, shews no inflammatory character ; it is not unfrequently met with of a less firm consistence than is natural, or than we might expect to meet with it in the particular case, but it is even long in coagulating ; all this I say depends on an abstraction of the nervous power. Under the idea of an inflammation, either in the spinal cord, or in the brain, many consider the best practice in tetanus to be issues, or blisters, along the course of the spine, or to the nape of the neck, some might think that such may increase the existing irritation, particularly during the time they are rising. The counter irritation, which they set agoing counterbalances this, much in the same manner as we would subdue a pulmonary attack, but the woeful mortality, after the symptoms are fully formed, plainly shews us that there

is little advantage to be gained by any regular and fixed plan of procedure, the practice must vary according to the state of our patient and other evident causes ; for, when we have a disease of either nature induced, we will find it is one thing to remove the cause and another the effect :—we know well that it is one thing to take away the exciting cause of a disease, and another to remove completely the effects which such has now induced, thus there is a something left in the system capable of keeping the fire burning. Our efforts therefore must be directed to quelling the general nervous irritation, and the earlier we interfere so much the more chance of success.

Blood-letting, in the more aggravated forms of either complaint, will be found to be of little avail for effecting this, particularly in Cholera. We will find that there are few tetanic cases which ever yielded to venesection or cupping alone, and fewer that have been saved by any plan of procedure. By opening a vein in cholera and getting the blood to flow freely we will in general, but not always, lessen the severity of the spasmodic affections. But of what avail is this ?—for the exciting cause still continuing in operation, although mitigated, is not by any means subdued, and we might just as well have had recourse to other remedies. Let none imagine that the abstraction of blood, under certain circumstances in this disease, will lessen the tendency to the fatality, for we want something else,—we require to set the blood in motion, upon which the whole functions of the body so much depend for their full and efficient play. Bleeding under such states of the system as here supposed will not do this ; we must not therefore depress these powers, by abstracting from the circulating medium, for in this disease the venous congestion will con-

tinue in spite of us, and the blood that we get to flow is not actually taken from the general mass, but only from that which is in circulation, which as we know is now greatly diminished in quantity,—consequently its abstraction must be detrimental in the extreme. It is useless in my opinion to talk about sanguineous congestion, and the removal of this curing the disease. Is the blood as a fluid of itself the cause of this?—or is the exciting cause of depression now in the blood? I should think it is by no means the first, it must therefore be a something else, which will be found to be a deficit action in the nervous power; give this system the power of acting, and we will, and must have a free state of the circulation again produced. I admit that blood-letting will empty the blood vessels to the extent abstracted, but then this will only serve as an inlet, as a matter of course, for the blood, on the more superficial parts, to collect again in the larger vessels without inducing re-action, or that of the nerves. Now we see that the blood must be abstracted from the quantity that is in circulation, and thus we do a double damage, and take from the circulating medium double that which we thought of a priori, without adding in any degree to the relief of our patient! To pursue the analogy a little further between the two diseases, not only as to symptoms, but treatment, some may say, under these circumstances, give large doses of opium, either in the solid or fluid form. This may do in certain cases of tetanus which are much above par, but in cholera, where the oppressing cause has always a tendency to act so, it is another question. But let me ask what would large doses of opium do?—will they not overpower the very action we want to keep in play? I imagine that every one will grant that opium, in large doses frequently repeated, produces a strong

sedative operation. Such being the case, the question comes to be, is this the action we want to establish in the particular case before us. Would not a *permanently* stimulant operation, especially in cholera, be that on which we could place more confidence;—it is imagined that the question bears feasibility on its very countenance. I am afraid that, in the more severe cases of Cholera and Tetanus, no one ever witnessed, large doses of opium attended with permanent good. I allow that such will subdue in part, and in part only, the severe excitement present in the muscles, but the subduction of this, although desirable, is not what we want produced; give the nervous power some play in the one disease, as it had at first, and these things will disappear. Here, however, we are placed between two fires, for we know that, if the spasms continue long severe, the powers of the body are thereby effectually weakened, and if we give opium to the extent that would appear desirable, we extinguish the other; so we see that a nice discrimination is required in the proper selection and administration of our remedies. Is it not a fact that, in many cases of tetanus, the stomach is very insensible, and even incapable of acting. This torpid state not only of it, but of the whole powers of the body would certainly be increased by the exhibition of large doses of opium; there is an instance in which no less than *thirty* drachms of undissolved opium were taken out of the stomach of a patient, who died of this disease!—is not this a caveat with a vengeance—I am aware that the subduction of the severe vomitings, purgings and spasms is of paramount importance; but, from what we have just seen, this is or ought to be effected by other measures than those capable of producing a *permanently* sedative effect, even of a few hours duration; this, of course, ap-

plies more to Cholera than Tetanus, from the circumstance that *all* the nervous power, in the former, is at *once* attacked, whereas in the other it is only a *part* of this system that is disturbed. The dilemma, therefore, in which we are placed, may be said to be very great, and requiring very nice discrimination. Liberal doses of opium given by the mouth, or clyster, in either disease, will be found of some utility in certain cases, but we may also discover that small ones will answer much better; these in combination with other anti-spasmodics, as the compound tincture of Valerian, with the exhibition of a purgative, suited to the particular case, and capable of acting on the bowels speedily and effectually. Phosphorus has been tried in tetanus, but has been unsuccessful in general practice. Thus then, have I gone over a contrasting disease, and pointed out the circumstances of analogous symptoms, as well as the views that ought to guide us in the treatment of each, although this has been out of place, chiefly as regards the *modus agendi*, it is to be hoped that the importance of the matter, thus early introduced, will prove a sufficient excuse for its insertion. I shall now go on to the consideration of Cholera itself; after having fully considered the cause and manner in which this operates on the human body, it will be no difficult matter to account for the other phenomena of the disease. In the prosecution of the remaining part of the enquiry we have still much to take into consideration, previous, however, to proceeding to the symptoms it may not be improper to introduce a quotation from a concise account of the endemic of Batavia, as given by Mr. Wade Shield, shewing evidently some of the symptoms of Cholera in other diseases arising from the same source as those already noticed. “The

“ patient without much previous notice is suddenly seized with giddiness and cold chills—sense of debility and vomiting, with pain over the orbits, and in the epigastric region. He frequently falls down, and is insensible during the paroxysms; his body covered with cold clammy sweats, except at the pit of the stomach, which always feels hot to the palm of the hand. The pulse is small and quick, on recovering a little this train of symptoms is succeeded by flushing of heats, &c.” The above then may be looked on as somewhat analogous to cholera when it first invades the human constitution,—it may not now be improper, after going over in this very lengthened, and perhaps some may say limited manner, some of the various phenomena of this disease to turn our attention to its symptoms.

C H A P. X.

SYMPTOMS.

It must be strongly impressed on the memory of all who have witnessed Cholera to any extent, especially in the East, that it is not one organ, or set of organs, that is assailed *seriatim et gradatim*, but the attack upon them all is sudden and unlooked for; it is unlike the generality of other diseases, therefore, in this respect. Even in fevers we will generally, if not invariably, find, at first, some particular organ or function disturbed. But in Cholera of certain forms, the whole functions, whether animal or vital are suddenly and as it were at once assailed, and the attack engages the system, even from the crown of the head to the feet. Nothing in the body can produce such an affection, be it remembered, more effectually than a derangement of the nervous sys-

tem. This, to my mind, is a forcible and most satisfactory proof of the *real seat* of the disease. In proportion therefore to its derangement, so will we have this or that function disturbed,—this or that symptom present, or in combination, according as this or that part of the nervous functions may be chiefly acted on, by that all-powerful cause, thus producing that vast variety of appearances to be met with, according to the peculiar condition of the body, or from the accumulating cause in the atmosphere. I again state that all these appearances are the effects of the great over-powering cause which has hitherto apparently remained involved in the greatest mystery, and that this great cause itself is only in consequence of some change, emanating from the many sources already noticed, thus producing a noxious state of the atmosphere, operating on and through the nervous power, thus producing the whole train of varied symptoms to be met with in this most fantastic disease, in almost every clime, age, sex, and constitution.

The most concise classification of the symptoms that I have as yet met with is certainly that of Mr. Orton. I shall therefore introduce it without any further comment.

FIRST STAGE.

Pulse soft, rather small and frequently quick ;—surface below the natural temperature, and moist ;—countenance pale and anxious—giddiness—headache ;—ringing in the ears, tremor ;—languor ;—depression of spirits ;—and sense of debility—nausea ; sometimes vomiting ; griping of the bowels ;—some loose stools of natural colour ; afterwards greyish—pale urine—thirst.

SECOND STAGE.

Pulse very small and weak—generally quick—sur-

face cold and blue—respiration hurried and oppressed—countenance sinking rapidly—extreme anxiety and debility—spasms of the voluntary muscles—frequent vomiting of whitish or transparent fluid, mixed with mucus; frequent purging of white watery fluid, with flakes of mucus.---Extreme thirst—oppression and burning pain at stomach, increased on pressure—gripping at intervals—no secretion of urine;—little secretion of saliva—copious cold sweat—voice hoarse and weak.

THIRD STAGE.

Pulse quick and extremely small; fluttering or imperceptible at the wrist—coldness and livor of the surface increased.—Respiration oppressed; occasionally stertorous---stupor---anxiety---facies Hippocratica---vomiting, purging, and spasm, nearly ceased---extreme thirst, no secretion of urine---mouth dry---skin moist, shrunk and shrivelled---eyes glassy or covered with a film---loss of voice---Linnitus aurium---blindness and deafness, frequently---diminished sensibility of the surface.---Death

INFLAMMATORY STAGE.

Pulse very sharp, extremely quick and small---surface wholly or partially hot and dry---tongue furred and dry---sunken countenance---various symptoms of gastritis, enteritis or phrenitis---the pulse disappears: and death generally ensues.

STAGE OF RE-ACTION.

Begins after sound sleep, or other symptoms of a favourable crisis, pulse quick and generally fuller than natural---skin warm or hot; perspiration---excessive secretion and evacuation of bile, and of peculent and watery matter from the primæ viæ---return of the secretion of urine, striking improvement in the looks, agreeable sensations; convalescence.

The above symptoms, it must be observed, although they follow in pretty regular succession, do not invariably do so. This, as a matter of course, depends on the extent of the power in operation against the system, when this is superabundant we may easily perceive why the vast variety of appearances will not follow in such regular train as has been here laid down. In the *mort de chien* species we will find that such follow pretty regularly, although even here, a variety may be met with. There are none who can mistake this disease when they first meet with it. I must, however, for various reasons already given, place the stage of re-action before that of inflammation, as this will not be found to take place until the system shews signs of returning vigour, and it might make a little alteration in the other parts, but this is of no consequence to the really practical surgeon. I am inclined to believe that in almost every case of cholera we will find the energies of the nervous system, at the very onset, a little increased, or thrown into that state of trepidation and alarm, which naturally depends on the first assaults of the epidemic. Although this increase of action does not proceed the length of inflammation, it may induce, as already stated, a distended state of the vessels of the part. Now the action at first induced, being gradually brought under, deprives the parts of their former healthy action, these are consequently reduced below par, before a really inflammatory state exists. The parts, in this predicament, are very apt to prove a stimulus to themselves, the moment action of a different sort, is again set agoing; this however, must be of an opposite kind to the present low state of it, which I suppose is being. Consequently, when re-action, of whatever nature this may be occurs, we will then have the parts very liable to be assailed by inflam-

mation, and now under a different state than before, for the action in being will not require to go the length of that formerly in existence before the invasion, the reason why, will plainly appear from the statement that these very parts, being reduced in their power of resistance, will be in a debilitated condition, and, like all other weak parts, will be liable to take on action compatible with their present state whenever they have got rid of the cause that oppressed them, an action therefore a little above this may induce the very state under consideration. This may depend greatly on existing circumstances, for we may meet with cases in which the sedative effect is soon induced and therefore the stimulant operation will be of short duration. Cases of this sort are frequently met with at Trincomalee, and in the river Hooghly, in which we will witness the powers of the system at once overcome, and death suddenly taking place. So may say that *exceptio probat regulam*, but I must still continue to think as I have written. This, however, as applied to this disease is a point of no very great practical utility, as bearing on the treatment or description of the disease, but we must bear it in mind when the stage of re-action occurs.

I would be inclined to divide the disease, as it attacks the human body, into three heads, such as cholera mitior, gravior, and gravissima; although, even from this, little practical benefit some may think is to be derived, yet we know that more recoveries may certainly be expected in the first class than in the second, and fewer in the third, than in either of the others. Mr. Orton has also given us a classification, somewhat after this method such as the

CHOLERA MITIOR.		CHOLERA GRAVIOR.
GENERAL CHARACTER.		
INCREASED ACTION.		DIMINISHED ACTION.

PARTICULAR CHARACTERS.

Excessive secretion of bile.	Entire suppression of bile until the favourable crisis.
Violent spasms of the voluntary muscles.	Slight spasms or none.
Moderate debility of the animal functions.	Extreme debility of the animal functions.
Full and strong pulse.	Extreme weak pulse.
Hot skin and flushed face.	Cold skin and sunken face.
Violent and frequent retching, spasms in the intestines.	No spasms in the intestines, not more than one or two evacuations by vomit or stool.

My third variety is only a greater increase of the symptoms of the second and occurring from the first, when we will find the disease making rapid progress, and generally to a fatal termination. There is yet another variety to be noticed, the cholera sicca: Dr. Good observes that Sydenham speaks of this, in which there is no purging, but there is an extrication of much air in the intestines, and generally happens in dyspeptic patients, this author retains the term although others have denied its existence; yet there is no solid reasons for this, as the disease is to be met with even in India, and was that species with which I was attacked at Trincomalee. “ But as the disease does exist, though it does “ not occur often, and as the distinguishing symptoms “ of anxiety and spasms of the extremities, which peculiarly draw the line between cholera and colic, are “ equally present in this and the other species, we cannot disjoin them without confusion. Usquebaugh, or “ the tincture of capsicum, has often also been found “ useful: and when the paroxysm has been removed, “ the restorative plan should be pursued, which has

“already been recommended for dyspepsy.” They are therefore all to be considered varieties of the same disease, but much more we may observe can be performed in the latter instance to effect a cure than in either of the others. Each variety of the epidemic will therefore admit of some modification of treatment, according to the existing powers of the body; what would be a proper remedy in the first, perhaps the only one required, such as bleeding, with calomel and opium, would be of but little utility in the second or third varieties. Here stimulants might be proper, do not, however, imagine that the use of calomel and opium is to be discarded from the treatment of any of the others, this is not the case, but we cannot place *implicit* confidence in either of them,—at least to the same extent as can be done in the first instance.

In cholera we may witness every variety of spasmodic actions, even as severe as in tetanus, going down the scale to the most slight nervous twitchings, and light flying pains, so that we see the severity, or lightness of them, is greatly diversified, generally, however, such are not so severe as the more aggravated ones in tetanus. The spasmodic affections will, in general, be found to be of greater intensity in the more robust, and in those possessed of considerable original strength in the nervous system, and this according to the extent and duration of the attack. The less severe they are, the better, provided there be not great debility of body, or that they do not occur under a most furious and aggravated form of the epidemic. There is another peculiarity to be noticed, and which we will not unfrequently meet with, especially in the stout and robust, it is, the greater the intensity of the spasmodic affections, so much the more certain are we of having a recovery, since these,

occurring under such circumstances, indicate a power in the constitution which will assist us in driving out the enemy, but let it be recollected that if they continue long, and do not seem to give way to our remedies, such will be attended with great danger, since they must now tend forcibly to expend the inherent strength, and consequently that very power which is requisite for re-action ;--they will thus do much damage. The proper plan of procedure in such cases must be always in our mind, and we should run to no extreme with it. Those cases in which the spasms are less, are attended with much danger, since they indicate a state of body favourable for the over-powering action, and thus afford an inroad to the disease, for here the nervous power has not the requisite stamina of resistance, and consequently may in some respects be said to be below par. The above opinions are fully corroborated by taking into review the cases of cholera as met with amongst the Natives of India, and also in the more robust European. In the former we generally meet with the low species of spasmodic action, while in the latter we have the more severe. I take such as have been formerly in possession of good health, and who have been guilty of no excesses, in those we will find that the average per centage of deaths and recoveries, between the two classes is immense, a relative per centage of course : the cause of this wide difference will afterwards come under notice. The continuance of these spasmodic actions must therefore be injurious from their tendency to excite a state of debility, and by their frequent repetition will only waste the animal and vital powers. They sometimes, though not perhaps so often as might be expected, assail the respiratory muscles, then the pain in the thorax is most severe, and we will find that anything which tends to excite the body, whe-

ther it be getting up to go to stool, or the continuance of the vomiting and purging, has always an effect in bringing them back again or rousing them into more active operation, provided the body has not now become too torpid. When they go off entirely, the parts that suffered often remain for a long time painful, and very tender to the touch, at all events we will find them very stiff and sore, the patient at other times only complains of uneasiness. They may also be found to keep coming and going, particularly if the change of temperature between the day and night, be in any way considerable, or if the patient lying uncovered in bed, be exposed during his convalescence to a gentle light wind; these pains and sensations of an uncomfortable nature may last from ten to fourteen days, after the termination of the more severe symptoms.

When we have much nausea and sickness present, we ought at all times to remove this as speedily as possible, since nothing tends so much to depress the bodily powers; we ought also in the treatment, at all times, to avoid such medicines as nauseate, for we may easily perceive that such might be productive of great harm.

There is one circumstance to be met with in this disease which alone must always strike the mind of the most inattentive--the great change that soon takes place in the general appearance of our patient, particularly in the features—His countenance is altered, and, although he may smile, it can easily be seen that there is a dread for the future concealed behind this, which can be detected by his looks. As the disease gains ground, as yet little or no pain in any part, unless perhaps a partial vomiting and purging, the shrinking of the features, with fear lurking behind the beguiling countenance, even in the most contented aspects is most evident. The face is

now perhaps more sharp than formerly, and as the disease gains on the system with an evident determination to fixed or flying pains, the countenance is peculiarly characteristic of a dreadful sinking of the animal and vital powers: the nose is more sharp, and of a whiter or paler colour, the eye-balls are now beginning to be retracted and the patient appears half awake and half asleep, or in that drowsy condition in which another would be, just recovering from a state of severe intoxication. The upper eyelids in others are half open, shewing the white of the turned up eye-ball, there is now an evident paleness and perhaps lividness about the lips, with a tendency to twitching of the muscles, if indeed the spasms have not already made their appearance. During this period the forehead and body may be drenched with perspiration or a fluid resembling it, often appearing in considerable quantity, and in large globules on the face and forehead, these descending from hence over the neck; at other times it has a thickish appearance and clammy *feel*. The patient's countenance, at times, is so quickly altered that even his most intimate acquaintances cannot recognise him, at all events they would be greatly astonished at such a change in the short space of a few hours, although the countenance during the progress of the disease, may assume a more lively appearance, especially after the more severe symptoms have passed, and when reaction is fully establishing itself, let us not be thereby deceived or relax in our exertions, such ought never to be done in any Cholera case; the treatment should be pursued steadily, and firmly, until the system shews evident signs of returning health, by a restoration of the various secretions. Such then is the aspect of things, so far as the countenance is concerned, in cases that run their course rapidly. There are

varieties to be met with in the less severe attacks, these it seems superfluous to notice.

It may be observed regarding the body generally, that we will be enabled to say to what extent the disease is making in the system, at first the temperature is not much lowered, or perhaps not at all; in some it may be increased, but when the vast abundance of fluid comes to be poured out on the surface, then we have a cooling process indeed, such is not to be wondered at, since we know that this is in general one of the means nature takes to relieve the system most effectually of the heat which it contains, whether this be superabundant or latent. I shall afterwards shew that this fluid which we see so abundantly poured forth, is not a true secretion. When therefore we see such poured out in streamlets as it were, running from the forehead and every part of the body, we will have a coldness and chillness present perhaps to the exact proportion of the discharge. Does the superabundant supply of fluid from the skin take place in conjunction with the vomiting and purging of the whey coloured fluids, or not? It is imagined at all events, that this is the period when it is most abundant, and that it does not shew itself in those cases of a more mild nature, at least to the same extent,—the reason of this will be noticed. Our patient very frequently complains of heat, although the thermometer actually shews a diminution of it. Such, however, is not to be expected in every case, as this must depend on the variety met with, in the different forms of attack, and also the state of the system itself, in fluttering so frequently between the rallying points of re-action and depression, this of course occurring from the extent of the oppressing cause. It is not therefore to be wondered at, that we should meet with the heat at times above par,

or at the natural and healthy standard. This, however, is more rarely the case, as the temperature, in the more severe forms, generally proceeds progressively downwards. We have also, soon after the disease shews itself, to notice a blueness under the nails of the feet and hands, and a shrinking of the skin, particularly about these parts, having generally a rugose and leaden grey appearance,—often very cold, and not unfrequently covered with sweat. The spasmodic affections may shew themselves in various parts of the body, during the progress of the disease ; they, however, most powerfully attack the legs and arms, and proceed from thence to the abdomen, or muscles of respiration. They will, in general, be found to commence at the extremity of the nervous system, such as the toes, fingers, &c. and mount up from thence, to the other parts. They are frequently very tormenting about the feet and toes, and, in proportion as the nervous power of these parts is worn out, or exhausted, we will find them proceeding to the more muscular portions ; this, however, not in regular succession, for they may fly about the various parts of the body, at the same time, and so quickly too, that, on leaving one leg or thigh, they will in an instant attack the other, and perhaps with greater virulence than the first.

Such then are the items of the disease of the more aggravated forms, in so far as the outward appearances go: nor is it to be wondered at that there should be a vast variety, or even an increase of the above symptoms. For example, we sometimes meet with instances of so overwhelming a nature, from the very first, that there is little, if any, vomiting or purging, with few if any sensations like cramps, the patient going down hill in proportion to the gradual, but sure dissolution, which takes place in the nervous system ; death may, in such

instances, take place during the first four hours, and even in a much shorter period ; he may be beyond all remedial aid during the first half hour of the attack. The impressions, therefore, given to the nervous system must modify the severity of the symptoms, as is evinced from the extent of the vomiting and purging, which almost invariably begins the campaign of the severe symptoms ; after the whole of the egesta are thrown out we have the more characteristic appearances of the disease,—a vomiting of a whey-coloured watery substance, with perhaps flocculent shreds floating in it ; if not, they will soon be present, the dejections also are of the same consistence, or, if altered, they may be of a gentle pink tinge. The spasmodic affections, after a time, keep pace with these symptoms, and are called into activity by the extent of the others. I have as yet said nothing with respect to the state of the pulse or respiration. It is a notorious fact that *few* patients recover who have the pulse gone from the extremities for any length of time, especially when there has been a profuse quantity of matter thrown off by vomiting or purging, or much fluid discharged from the skin, when attended by a great diminution of animal heat, and more particularly when these appearances are accompanied by a rugoseness about the toes and fingers, with the blueness under the nails, and a remarkable sharpness about the nose. The pulse may vary according to circumstances, which have been already abundantly alluded to, the variety to be met with will be in proportion to the energy of the nervous power, in co-operation with the state of the respiration. Upon this idea, therefore, we can account for the changes in the state of the pulse ; in proportion to its stability or firmness, so is our patient's safety. With the progress of the disease we will find the

pulse change, becoming more feeble, until perhaps it entirely disappears, thus evidently shewing the extent of the ravages of the disease, with a too marked appearance of depression of the vital functions. We will find that the pulse becomes very quick, and scarcely to be felt, as the symptoms increase in severity,—so small and quick as not to be counted; we may feel it, as it were, fluttering or hovering. We see the same sort of phenomenon occurring in animals when bled to death, or in cases of severe hemorrhage. This is easily accounted for by taking into consideration, that, in proportion as the amount of the vital current is abstracted, so is the irritability of the nervous system increased, and both systems lose their power of action, from a want of that *permanent* stability, which formerly kept the system in efficient play. I shall afterwards attempt to prove that this state of the pulse takes place from a deficit of blood in the system, as well as in the circulating medium. The respiration is not, perhaps, at the very onset of the attack, much altered, but, as the symptoms progress, and the natural secretions become locked up, it becomes in some measure irregular—either altered in frequency, oppressed, or decreased. It will be found that there is some change in this action, particularly about the middle period of the attack, and to such an extent as materially to incommode the circulation of the blood; as the difficulty increases, so is the blood improperly oxigenated, and very imperfectly circulated, thus proving to a demonstration that there is a powerfully depressing cause affecting the whole nervous system, particularly the sensorium commune; this being depressed, sends forth an analogous action, or perchance none at all, hence the respiratory apparatus as well as the general system is overwhelmed. The breath of the patient is often found

cold, and a thermometer placed under the tongue, when the disease has been of some duration, evidently shews a diminution of temperature; as the patient becomes more heavily pressed, the respiration becomes more slow and laborious, until, at length, the difficulty becomes so great that we see the whole of the respiratory muscles, particularly those of the ribs, called into play, when death soon gives relief to the miserable sufferer. There is an inquietude or jactitation, which is very galling, not only to the patient, but also to his medical attendant, as it prevents any external applications; this too, is not unfrequently the precursor of sudden dissolution. I have never seen a case recover, or even survive long, in which this has been severe, more especially if attended with some of the other severe symptoms; we may then certainly expect a sudden termination of the disease. Almost immediately before death, this restlessness sometimes disappears, when we may perchance fancy that all is about to go on well---fatal delusion---since the greatest portion of the powers of the body is gone, now the laborious state of the breathing succeeds, and the victim gradually, and at times almost imperceptibly slides out of this existence. The animal and vital powers suffer in proportion to the urgency of the above symptoms, and lingering existence is soon exhausted. Dr. Kennedy observes “but nothing appeared to have the
 “ least effect; nature never rallied, hope never deceived; the patients fell weaker and weaker, and grew
 “ colder and colder; death gradually stole on, and when
 “ the poor creatures expired, it rather seemed as if they
 “ had been so many hours dying, after many weeks of
 “ disease, which had worn out the energies of life, than
 “ the fact, that these few hours, had been the short and
 “ only transition, from apparently perfect health to

“dissolution. It is enough to make my heart ache
 “to think how many similar cases I have since witnessed.”

The anomalous appearances to be met with in the disease are many, and must necessarily be so, not only as regards the symptoms to be seen in the different cases, but as we might expect, we shall also find, a corresponding variety in those of the *post mortem* inspections. That these depend on some part of the nervous system, supplying this or that set of organs, as well as on the intensity of the operating cause is certain, and I think cannot be satisfactorily accounted for in any other manner. Thus, we may have the attack attended by spasmodic affections of the muscles before the appearance of the vomiting and purging; this, however, is not frequently met with;—or, we may have the disease without much vomiting or purging throughout,—or, no vomiting and but little purging,—or, the epidemic may shew much cerebral disturbance from the very first, or, on the other hand, it may be long in doing so, and we may have either the one or the other condition of the brain in existence during the progress of the disease, or, we may have the one following the other in regular succession; and on dissection, each part, according as it has suffered, will show some marked appearance of this or that organ having been chiefly oppressed by venous congestion or an infiltration of blood. If the disease has shown signs of much irritability of the stomach and bowels, we will meet with many of the above appearances. If the brain has been chiefly concerned, here also will we meet with a sufficiency to account for the torpor that may occur towards the conclusion of the particular case, and so with the other parts,—this in proportion to the extent of the nervous excitement, or depression, which

is the cause of derangement. We need not now be surprised to meet with this or that particular appearance on dissection, or any diversity of symptoms; since, as has been stated, all these things depend on *one* universally operating power, which may either be in a major or minor degree of existence, and in this or that compartment of the system. I shall here introduce a quotation, shewing the great variety of symptoms to be met with: not only do we occasionally find that there is an absence of all spasm, as well as purging, or even vomiting, but also that “trismus has been observed in a “considerable number of instances. It does not “appear to have indicated any thing very remarkable. “The jaw has frequently continued locked for several “hours. Symptoms approaching to Hydrophobia have “also been not unfrequently remarked. Hiccough is “of common, though not general occurrence; and, “it would appear, chiefly during recovery. I have enumerated syncope as an attendant also on the disease, it “must exhibit a woeful state of the system. Delirium is not an unfrequent symptom. Pain and soreness of the muscles which have been affected with “spasms, are common during convalescence. Tenesmus and strangury are both noticed in the “description of the disease by the Bengal medical “Board. *Bloody stools are also not of uncommon occurrence.* In the short description of the disease “given by Celsus and transcribed above, they appear to “be noticed, and they have frequently been observed in “this epidemic. The Medical Board of Bengal likewise mention bloody stools as an occasional symptom; and Mr. Ogilvy of this establishment, reports “several cases in which the evacuations were almost “wholly composed of pure blood. Weakness and loss

“ of voice have already been noticed. It is remarkable
 “ that the veins of the surface are frequently noticed to
 “ be full, even turgid, at the same time that the circu-
 “ lation is extremely weak. If bleeding is attempted,
 “ the veins of the arm quickly empty themselves ; af-
 “ ter which it is frequently found difficult or impossible
 “ to draw more blood. In fact this proteiform disease
 “ seems occasionally to assume all the characteristics of
 “ fever. Mr. Robertson places it in a still stronger
 “ point of view :—This disease displays great variety
 “ in its mode of attack ; which is certainly influenced by
 “ the constitution of the subject. Thus, amongst our
 “ admissions into hospital, I have observed that men
 “ who had been exposed to the remote or exciting caus-
 “ es of fever, were seized with a cold chill or shivering,
 “ and a great weakness, they said such as they never
 “ felt before, with sometimes a loss of sight, these were
 “ succeeded in a short time, by a hot skin, quick and
 “ tolerably feeble pulse, acute headache, intense thirst,
 “ sickness and sometimes vomiting, great oppression in
 “ the chest, and a tendency to spasmodic twitching
 “ there, without much affection of the bowels, a re-
 “ markable sense of pricking in the extremities is fre-
 “ quently found to precede the spasms and even to oc-
 “ cur independent of them. “ This is attested by three
 “ or four medical men, some patients comparing it to
 “ the breaking out of an eruption on the skin, others
 “ to prickly heat, &c. It is so common as to be noticed
 “ in a Native work, where there is distinctly stated to
 “ be ‘ pricking pains in the body’—while others com-
 “ plained of a sensation as if their bodies were pricked
 “ with pins.” Such then is an enumeration of the ano-
 “ malous appearances, many of them indeed frequently
 present in the same case, and all of them tending to the

support of my hypothesis as to the causes, and operations which occur in this disease, not only as to what has been already noticed, but what remains to be yet brought forward : it may be also observed that I have introduced this very lengthened paragraph for many reasons which will appear in the sequel.

I may state, in as concise a manner as possible, that the appearances met with on inspection are pretty uniformly the same, as regards the congestion of the various parts of the body. It may not be improper, however, to introduce a case from my notes, which will illustrate the general ones, always bearing in mind that, according as this or that part of the system is chiefly involved, so will we meet with these states existing. The case is that of a seaman, in which transfusion was had recourse to, in order to save his life,—but all to no purpose. On opening the pericardium the heart was fat but not overloaded, the two large veins on the left side were turgid with black blood, the smaller branches leading into them were as distinct as if they had been injected with blue wax, and this appearance was distinctly traceable from the apex to the base. This evidently shews a venous congestion, and I certainly think that the cause of such proceeds from the almost total cessation of the nervous power of the heart. The lungs presented nothing unusual, there were slight adhesions in different parts of the thorax, but they did not proceed from this disease ; they were in a slight degree loaded with blood. On tracing the alimentary canal, the intestines were firm, and felt as if thickened through their whole extent ; at the superior portion there was a considerable quantity of fluid and some flatus,—at the inferior flatus, with a small proportion of fluid. About twelve inches from

the caput coli, there was a sort of stricture, at all events an evident contraction of the alimentary canal, this was, however, sufficiently patent to allow any feculent or other substances to pass, and by no means indurated. Nothing unusual was observed at any other portion of the canal. On removing the intestines the vena cava and aorta were brought into view, a few inches above the venous junction, and also below this last measurement, the vein and aorta were secured, and removed ; previous to their removal the vein did not appear any thing like turgid, and the artery was in its usual state, but containing some blood ; on opening, black blood came away from each, very nearly of the same shade, if there was any difference, it was scarcely discernible by the nicest eye ; on washing these portions nothing of an unusual appearance presented outside ; on laying them fully open, the internal membrane appeared a little higher tinged, than it is generally met with in other cases,—the vein was of a light pink, and the artery of a vermilion tinge. The bladder contained about half a pint of urine, was contracted and hard. The kidneys were of a healthy colour, and the pelvis of each perfectly free. The spleen was somewhat turgid with black blood, which issued from it when cut into, and when gently pressed. The pancreas had its natural appearance,—the liver also was healthy, but when cut into, black blood also flowed from hence. The gall bladder was full but not turgid, and of a healthy colour. On removing the stomach, which was nearly quite full of fluids that had been partly administered during the treatment, and washing it externally, the coats were rather highly coloured but not of a vivid appearance ; on emptying and laying this open, from the cardiac to the pyloric portion, there was

one of the most brilliant appearances I have ever seen at any inspection,—it surpasses all description. Suffice it to say that the nearest resemblance was that of the *arbor vitæ* coloured red. Here, however, the main trunks were much broader, being nearly a quarter of an inch in breadth, and running, in a longitudinal direction, from the cardiac to the pyloric extremity, along the greater portion of the stomach. There were five or six of these main branches at nearly regular distances, of about three quarters of an inch. In the intermediate spaces the parts were literally covered with very minute vessels, having a most beautiful chocolate red appearance, their colour may be very aptly compared to what Japanese term the *cochleco* colour. The above are from the notes made by myself at the time of inspection. It may be worth while to state a few particulars of this case. The patient, a robust stout man, was attacked on the 31st October 1832, and was convalescent on the evening of the fourth of November, or five days after. But, in consequence of a foolish headstrong disposition, having exposed himself to cold in getting out of his hammock and laying naked on the deck near a port, he was very soon after this attacked with the most distinct symptoms of the disease, and died at noon on the sixth. I think it proper to mention this, since some might be apt to draw some rather curious inferences from the state of the various viscera as shewn on inspection, as to the nature and seat of the disease. I do not think that inflammation was actually present ; it could have been wished that such had been the result of the second attack, as in that case we would have had some chance of prolonging his life. My opinion of this phenomenon, or singular appearance met with in the stomach, I have else-

where given,—particularly in the essay on Dysentery,—that such may be met with without an actual state of inflammation existing in these parts. I find the following additional remarks in my notes. The above was a case, like many of the others, of simple purging at the time the epidemic was prevailing, not giving much pain, but then, there was a peculiar anxiety manifest in the countenance;—he had even so far recovered as to be pronounced convalescent. He went to bed to all appearance with little or nothing unusual to disturb him, and although of a perverse disposition, had no complaint; in the morning he had been complaining of a sense of sinking about the præcordia, this, however, went off entirely in the course of two or three hours. He, as well as many others, was much alarmed when he knew that a death had occurred. In no disease with which I am acquainted did I ever witness equally injurious results of the depressing passions as in this,—the effects they produced were always manifested on the general system. There is every reason to believe that this man would have recovered even from the second attack; for the pulse, although gone from the extremities returned, with animation of countenance, as well as heat of body, which also assumed more of its natural appearance,—he was sensible and refused to take medicine. With such a patient, and such a disease little could be expected. When in good health he had a most voracious appetite, and gorged himself so much at times as to bring on bowel attacks. To these appearances, as met with in the above case, the following may be added. We not unfrequently meet with various portions of the alimentary canal lessened in diameter, and also the bladder in a contracted state. It may be observed that in the act

of dying *seriatim*, or in that state approaching to it, all the muscular fibres have a strong tendency constantly to shorten themselves,—contracting towards their fixed points. Hence it follows, that the intestines, or bladder being circular, and in possession of muscular power, must contract upon themselves, and consequently produce a diminution of their diameters, as this contraction exists equally throughout the whole circle. This state is perhaps more likely to occur in cases of sudden death, and where the nervous power has previously been in a great measure destroyed, the other parts still keeping up their powers, in some degree, after the loss of tone or energy in the contracted portion. This is the reason why we do not meet with a contracted, and somewhat thickened state of these parts, in a natural death; for all the powers of the system, being gradually expended, there is no excess of action in one part or deficit in another. Hence also we may account for the rigidity or stiffness of the body, after life has become extinct, and the parts *cold*; for the muscular fibres contracting towards their fixed points, will continue in this state until some cause is applied or present to render them flexible. Putrefaction soon does this, and releases the conservative principle from keeping up the grand symmetry of the frame.

It may be said that women, children, or old men, are much less frequently attacked by this disease than others; it is something strange that those in whom we meet with a laxity of muscular fibre should be so exempt; is this strictly correct? It may be said that in the latter instance, or that of old age, the premises are not well drawn as strictly applicable to this disease. As to women and children, it may be noticed, that they are placed under very opposite circumstances to those

of men, generally the victims of Cholera, who have perhaps indulged in the various excesses of life ; such as drinking, with the multifarious items in the class of debaucheries, by which they may not only have impaired their muscular powers, but have been subjected to the injurious effects which such a mode of life produces on the *real* stamina of the nervous system—the source from which emanate the operations of the whole machine. Now generally speaking neither women or boys live in the above way. These observations are of a general nature, consequently, although we may meet with a laxity of fibre in them, their nervous power is great, or much more so than that of the men, who may be as to muscular power alone, precisely under the same circumstances, but then their nervous system is weak from the causes stated. There is another point of importance to be noticed: the sedantary life of females, excludes them in a great measure from the cause of general exposure, and, in this respect, they are differently very situated from either the men or boys. As to the latter class, although they may be constantly in the open air, yet we have to take into consideration, that their nervous power is much firmer than in any of the other two classes, since it is growing in strength, and like a young tree will in general be found to renew its bark, although an old one will not do so, at all events half so quickly, in the vast majority of instances. It therefore, follows that the young or the old of both sexes will suffer from this universal cause in proportion to their power of resistance. That the above statement may not appear at fault I shall here adduce a fact or two in support of it. The black dames, especially in most parts of India, (for here they certainly cannot with propriety be called

the *fair* part of the creation,) suffer in an equal proportion from the cause already noticed, as they in general have much intercourse with the atmosphere, in their carrying water for *household* purposes, which the men seldom if ever do: I here speak generally, of many parts of the eastern climes, where a Native male would consider himself degraded to do such; but then this again, as it affords much exercise, may, in the same proportion, render their bodies more firm than those of the men, and, in consequence, they may suffer in a less degree. This may apply to other water carriers, &c. in other portions of the world when an epidemic is raging. Let us look to another quarter, and take into consideration those women who are to be found about camps, or other places, mixing freely with the men, living in a great measure after their manner, and engaging not unfrequently in their revelries, (I mean no slur to the ladies of such places), what do we find to be the case in such instances? It will be found that the females alluded to, will be attacked in the same proportion as the men, and will suffer to an equal extent, this in proportion to their indulgences in this mode of life. It may be said that this may be the case in some instances, but cannot be allowed in all. I do not mean to say that we will meet with this as an universal occurrence. God forbid that such should be the fact, but if it happen in *some* instances, under the state mentioned, there is nothing to forbid the inference that it should do so in every one place, all things being equal. It may be said, and truly so, that many women, who have been guilty of no sort of excess, have died from attacks of this nature,—so have men. It must, however, be observed, and it is to be hoped that I may not be called scurrilous in bringing the fact to notice, for it is well known to many that

there is a great deal of that private dram-drinking or tippling which is constantly to be met with amongst every large body of way-faring men ; now by placing the one in contrast with the other, we may be enabled to see causes enough, to which we may ascribe the apparent difference. It therefore follows that women and young people will remain free, or be less liable to attacks than the men, only in proportion to their well regulated life, and the strength of their bodies : and that old men or worn out constitutions will be attacked in proportion to their remaining vitality, and former habits. It is a notorious fact that many, very many, old men are every year carried off by cholera in India, and in short in every place visited by this direful pest and scourge of our race.

The blueness of the lips, and under the nails, is only to be met with in those diseases in which there exists an imperfect state of the circulation, no matter whether this proceeds from an obstructed action of the powers of the heart, or from an imperfect purification of the blood. The instances, evincing the same sort of colour in the lips, in other diseases, are so familiar to every one versant with the characters of such that they may be passed over without further comment. There can be no doubt that the blue state of these parts proceeds from the same source, viz. an imperfect state of purification in the blood in circulation, I may be told that, in a person with a proper circulation of the blood, and with no impediment to its purification, cold will produce exactly the same appearances. This is at once granted, but will any one state to me distinctly the effects of cold on the nervous system generally, or on the nervous powers of the part *alone*, either as arising from the state of the atmosphere, or from long bathing ; or, can he say that the blood is pro-

perly circulated in these parts, or that there is no stagnation of it here during the continuance of the operating cause; thus producing, for the time being, a sort of congestion of the blood in these particular places. If these questions be answered, it is imagined that the problem will be soon solved as to the appearances to be met with in this disease; and although not depending perhaps on the same cause, it may consist in a disturbed action of the nerves of these very parts, thereby causing an imperfect circulation in them; but, in cholera, this is more likely to occur from a general, than a local cause; it is certain that such a state exists in the blood itself in such cases.

There is another circumstance, as connected with the depressing passions existing in cholera, which yet remains to be noticed. In many cases the headache, on the first assault, is severe, or this may come on during the progress of the complaint; in others it is not at all so, perhaps during the whole continuance. We will always find, however that there is more or less of cerebral derangement, either as portrayed by the eyes, or the general indication of the countenance. The mind being vacillating and the patients rather timid, since this, above all other epidemics, seems soon to overpower the strongest nerves, and the most determined mind, and may be aptly and justly compared to fits of epilepsy, in which the stoutest patient *must cry* in defiance of himself, at this very time he has the most fearful and ominous sensations, and thoughts concerning the future; this is more particularly the case when they see their dying comrades so tacitly resigning their lives, without a struggle. Enough of misery to be seen even to appal the bravest of the brave, in whom no foe, with sword in hand, could inspire dread, yet this fell demon of a disease induces *that* which the above cannot make them feel. I have noticed the depressing

passions most powerfully pourtrayed at the bed-side of a very old and faithful soldier, and operating powerfully on the minds of the nurses—men of the same regiment. “Aye, there is poor old Jack gone, who has been in all the Peninsular wars, and many other battles, although often wounded, yet always got better, facing foe after foe, yet none could cut his thread of existenee, but this most damnable disease cuts him off at once.” Such is nearly the language I have heard made use of at the bed-side of a patient; the man who uttered it was so much oppressed with his towns-man’s fate, (for they had been old *chums*,) as to lie down, and shed tears; he was shortly after attacked and himself a picce of inanimate clay in less than six hours after. The presenee of such seenes has a most powerful and destructive effect over the minds of the living; this, therefore, is one reason why we should never have many Cholera cases in any single apartment; the mental impressions produced by fatal cases are so powerful that they work not a little destruction by giving access to, and hastening the speedy operation of that which so much overpowers the nervous system; this is soon manifested in a high degree, and there is now perhaps a more severe attack than might otherwise be the case. I have seen this mental depression strongly pourtrayed throughout the whole progress of the epidemic, and, even in successful cases, found it remain for some considerable time during convalescence, which, under such circumstances is often found extremely difficult to manage.

It may be asked how I can aecount for sporadie cases of Cholera, without the presence of an epidemic cause. This may be answered in part, by the following quotation “rapid atmospherical vicissitudes, in regard

“ either to temperature or moisture : exposure of the
 “ body to currents of cold air, particularly the chill of the
 “ evening, after being heated by violent exercise of any
 “ kind, inducing debility or exhaustion ; low marshy si-
 “ tuations ; flatulent or indigestible food, especially
 “ crude and watery vegetables, which compose a large
 “ proportion of the diet of the Natives ; and particularly
 “ that general undermining of the constitution which
 “ arises in a condensed, dirty and ill-fed mass of popu-
 “ lation are all unquestionably powerful pre-disposing
 “ causes.” The above, as given in the Bombay reports,
 shews evidently what may at times give rise to
 the disease under any circumstances, but this more
 particularly towards the approach of hot weather. I
 say then that all cases of Cholera, whether occurring in
 consequence of an epidemic cause, or the reverse, ope-
 rate in producing a derangement of the nervous system,
 whether this be from debility or from the other causes
 stated, or, as we have seen, from an injury in some way
 or other inflicted on the nervous system. By referring
 to what has been stated as to Tetanus, we will observe
 that Cholera as well as this last named disease, may
 arise from irregularity of bowels, or *vice versa*. A man
 for example, who has been under the same circumstances
 as regards diet with the other seamen, has, during the
 day, been exposed to the great heat of a vertical sun for
 many hours, and in a profuse perspiration goes, or falls
 into the water from a boat, remains there for a length of
 time up to his neck, assists it, may be in loading it, and
 at length goes on shore after an hour’s exposure, ne-
 glects to change his clothes until a fitter opportunity,
 comes on board in this state in the *cool* of the evening ;
 when, as might be expected, he is attacked by a bowel
 complaint, or vomiting and purging, which soon becomes

severe, and assumes all the characteristic features of Cholera, but why the disease should not as well be dysentery as Cholera many may ask. An instance of a similar nature occurred in His Majesty's Ship *Success* while lying in Bombay harbour; the cook employed at the oopers during many hours, in a profuse perspiration, placed himself in the bow-port where there was a considerable breeze, he was not long there, although a very stout man, when he had an attack of vomiting and purging, which soon assumed all the appearances of Cholera, attended with the most severe cramps of the body;—the same question may be asked here as in the above instance. I have already stated my opinions as to a delirious, infectious, or contagious condition of the atmosphere, being in almost constant operation, particularly in intertropical climates, and it is this state that most strongly pre-disposes to the attacks; but it has also been said that epidemic or endemic dysentery is a disease produced by the same operating cause, but this in a minor degree of concentration. Be this as it may, we know that many diseases of this class spring from these causes, and it is most likely that such are determined, as has been before noticed, by the lesion inflicted on the nervous power; that, if this be slight, it will consequently be either long in shewing itself, or another disease will in all probability be induced, very different from either dysentery or Cholera,—it may be fever, either of the Batavian type or of the intermittent species, such depending on the climates and places in which exposure takes place. There is one thing which may astonish us, and it is why these occurrences do not daily take place from such exposures. It may be answered that, besides the variable state of the atmosphere, man is not at all times equally liable to, or fortified against, such attacks, for many evi-

dent reasons, such as his previous mode of life and manner of diet, and the impressions of his mind not being always the same, each or all of these may certainly vary in some degree. The peculiarity of atmosphere referred to, may be strong to-day, weak to-morrow,—to-day the breeze may come sweeping along a morass, or through a thicket of almost impenetrable jungle, as happens at the changes of the monsoon,—to-morrow it may blow from a different point of the compass, and a small variation in this respect may be sufficient to influence either the presence or absence of the operating cause. Why do not these things occur in all climates, precisely the same as respects thermometrical changes? The answer is easy, it is to be explained as above, with the addition, that all climates are not exactly the same as regards the nature of the country. Exposures therefore under these circumstances, may induce diarrhæa, dysentry, erysipelas, and a vast variety of other diseases, according to the prevailing disposition of the atmosphere, or climate; or in other cases according to the irritating cause, within the alimentary canal. That this is the case in all instances we may easily believe, more particularly when we observe, soon after the occurrence of these sporadic cases, any of the above diseases present, raging in an endemic or epidemic, form—such as intermittent or remittent fevers, either of the bilious order or otherwise; on minute enquiry we will find this to be the case. Such then is the manner in which I would account for spasmodic cases of whatever nature; They all depend on a previous derangement of nervous energy, either as caused by the state of the bowels, or as above stated. But in cholera this particular condition of depression is not that induced by long continued disease; if there is to be an attack of this nature, the extent of the cause

makes it operate at once, if not so, we have disease developed under a different form.

Nothing has yet been said as to the propriety of the term Cholera. It is imagined to be of but little importance by what name we designate this epidemic, so long as we have a proper notion of the disease, in its origin, symptoms, and treatment. What is in a name? every thing, but in this instance it is only tantamount to Shakespear's description of Honour. I ask will the bare knowledge of the true term lead us to a better mode of practice?—it is imagined that it will not; I like the term as handed down to us, at all events as applied by Celsus, and will therefore retain it, and leave to others plenty of room for the display of their school-day erudition;---no matter whether the term means a drain of this or that nature, or a spout of this or that form, or even a water spout: those who are fond of playing on words will find abundant opportunity to do so, by grasping at the shadow rather than the substance. It is perhaps of still less importance to us, who are really in search of truth, to know that such and such modes of treatment were in former days adopted,—a host of classical lore could at once be adduced in support of the premises; it is of much greater moment, however, for us to be fully aware, that the treatment of former days will not do in the more severe forms of the disease. It becomes us therefore to profit in part by experience, although we should not heedlessly follow the old and beaten tract, but form one for ourselves. I shall pass on to points of more consequence; in the investigation of these I may have enough to contend with, and will therefore quarrel with no man about terms:---if my reasoning be only intelligible I am satisfied. Any one, by giving a candid perusal, and candid criticisms, will

not only add to my information, but also to that of the world ; a point of much more importance than any in which *self* is alone concerned : with such an idea, let us now turn our attention to the examination of a subject which has been purposely left to this place—it is the state of the secretions in this epidemic.

I state, in a general manner, that the secretions, or more properly the discharges from the intestines are various, and perhaps in no other disease, with the exception of Dysentery, do we observe such a variety. They may be of a blackish chocolate appearance, such as we occasionally meet with in other complaints, or they may vary from the slightest pink colour to that of the blood, or they may be of the darkest green, approaching to black, or from the lightest clay, or congee watery appearance to that of a blueish caste. Each of these states evidently portrays the force and extent of the disease, as well as the innate powers of the system. It may be observed, as a rule for our guidance, that the nearer they approach the natural colour, so much the more manageable will we find them, also the higher the colour, so much the less danger is to be apprehended. The lighter they are so much the more will we require to redouble our efforts, for we will find that those cases which shew the watery discharges, not unfrequently have a fatal tendency. This, although a rule for forming our prognosis, ought not to lead us to give up all hopes of our patients ; we must pursue the treatment with unrelenting vigour,—the very danger of the patient, or difficulty of the case, should be a high stimulus for the full display of our well known patience and perseverance. This, the more especially, when we are aware of the fact that no case is absolutely hopeless : there are even instances in which patients have

recovered from Cholera, who have been laid in their coffins as dead. The very circumstance of the system being in such a low state, should induce us, by every means in our power, to try and turn the tide of affairs in our own favour; this may, in many instances, be accomplished, by perseverance alone in the judicious administration of those remedies even now a days within our grasp; we may find that, at times, a surprising restoration, from an otherwise inevitable death, may be thus effected.

It will be proper to take a survey of some of the phenomena which attend the production of Hemorrhages in the system. Dr. Cullen says, “ some irregularity in the distribution of the blood occasions
“ a congestion in particular parts of the sanguiferous system; that is, a greater quantity of
“ blood is poured into certain vessels than their natural capacity is suited to receive. These vessels become
“ thereby preternaturally distended: and this distention, proving a stimulus to them, excites their action to a
“ greater degree than usual, which pushing the blood
“ with unusual force into the extremities of these vessels, opens them by anastomosis or rupture; and if
“ these extremities be loosely situated on external surfaces, or the internal surfaces of certain cavities that
“ open outwardly, a quantity of blood flows out of the body. This reasoning will, in some measure, explain
“ the production of hemorrhagy. But it appears to me
“ that in most cases there are other circumstances that
“ concur to produce it; for it is probable, that in consequence of congestion a sense of resistance arises and
“ excites the action of the *vis medicatrix naturæ*, the exertions of which are usually made by the formation
“ of the cold stage of pyrexia inducing a more vigorous

“ action of the vessels ; and the concurrence of this ex-
 “ ertion more effectually opens the extremities and oc-
 “ casions the flowing out of the blood.” Thus did Cul-
 len imagine that, in all cases of hemorrhagy, there must
 be a preternatural distention of the blood vessels, and
 that this was called more effectually into operation by
 an increased action or re-action of the system, that the
 efforts of the *vis medicatrix naturæ* aided greatly in
 bringing this action into active operation. In Cholera, do
 we not find a venous congestion ? But he no where al-
 ludes, nor do other authors, so far as I am acquainted
 with their works, ever imagine that a *torpidity* of what
 he or they choose to call the *medicatrix naturæ*, or the
 nervous power, will, by its being abstracted, allow the
 blood to flow as freely, and collect as abundantly as he
 or they can say it does from congestion. I say then
 that an overwhelming depression of this power, by in-
 ducing a certain state of the vessels, and depriving the
 blood of its vitality, will permit it to flow as freely as if it
 came from the open mouths of the vessels themselves, in
 other instances, and it is, in this way, that I would
 explain the manner in which such occurrences take place,
 in the more weakly and less sanguineous subjects, or in
 any case in which there exists that deficit of power in
 the nervous system, which I have stated to occur in this
 disease: I have also said that such are my views in
 respect of some other diseases besides cholera. I view
 therefore the discharges that occur in Cholera to be no-
 thing less or more than a *hemorrhage* from the intes-
 tines, the reasons for this opinion will afterwards be
 given, when I hope to prove it plainly and satisfactorily;
 in the mean time, I go on to answer a question which I
 have no doubt will be asked by many. If your views be
 correct why do we not meet with a discharge of red

blood? The question is not only pertinent, but proper; and my answer is that we *do meet* with such an occurrence in a major or minor degree, not only at times but frequently, and the reason why it is not oftener met with is that the blood may be supposed to have undergone some change, by which it parts more readily with its serous particles; this is the more likely to be so, when we consider that it is only at the onset of the disease, or towards the patient's recovery, that such occurs, when re-action takes place, under each circumstance we may meet with the discharges of a *pink* appearance, especially from the arms, shewing evidently that in such cases the blood has not suffered to the extent fatal to life, or that it is now recovering the *vitality*, it had lost. I know, and it has already been stated, that a variety of appearances are met with in the dejections, but the most frequent are of the congee sort, especially in the aggravated forms of the disease, or those of a light slateish, or somewhat thickish clayey watery consistence, clearly pointing out that it is the *serum of the blood*, which is varied in degree, and consistence, according to the magnitude of the exciting cause. It may be said by some, that I no doubt allude to a chemical or other change produced in it, either by the operation of the nerves, acting somewhat like the conductors of a galvanic battery, or according to some other action not yet understood. This is precisely my view of the business, and let others, who have more time, and greater abilities for the prosecution of this important subject than I have, find out, what particular change the blood undergoes in consequence of the derangement of the nervous system. Even when such is done, it may not lead us to a right conclusion, as to the treatment; since the liv-

ing body, although instanced to be, in some measure, acted on like a galvanic battery has only been compared to this from the want of a more proper illustration ; it has been brought forward, not with any idea that this is actually the case, or that the two actions are very similar ; no, no, there is, and always has been, a difference existing between animate and inanimate matter. Let the chemists do as they please, this difference, will still exist, and bid defiance to all chemical laws. To convince ourselves that it is the serum of the blood, which is in a great degree mixed with the discharges, it will be sufficient to pour the serum, from blood drawn from the arm of any Cholera patient, into a vessel, and compare it with the dejections,—we cannot help being forcibly struck with the great similarity. I may observe that there is little serum to be found in the blood when drawn in Cholera cases ; this, however, depends on the period of abstracting it, for if it is done at the commencement of the attack we will, as might be expected, find a greater or less proportion of this in proportion to the extent to which the disease has been attended with much vomiting and purging of fluid materials ; if we can get any blood abstracted, in the latter period of an inveterate case, we will find that there is but little serum. Where then can this have gone to ? In such cases, as we will observe, very little blood flows, it has all forsaken the surface ; it is not in the blood vessels in extraordinary quantity, in any case of severe disease, it is even not dispersed amongst the larger viscera, nor are the more fluid parts of it insinuated amongst the muscular parts of the body, since they also are rather diminished than increased in bulk. The blood, on inspection, after life has become extinct, is found to be *thick*, this

not only in the veins but in the arteries also. Now, in what other manner can we rationally account for the deficit of the serum of the blood, than on the supposition that it is poured into the intestines? That hemorrhagy from the intestinal canal occurs in consequence of the operation of some suddenly existing power, which at once, in a manner, destroys the nervous energy of the parts, or perhaps in other instances excites the system into too great activity, may appear, when we consider that this state is often excited by various poisons when taken into the stomach, as well as, in other cases of disease. I think that this incontrovertibly proves my opinion, as respects the appearances to be met with in the dejections of Cholera cases,—that all of them proceed from a cause or causes operating on the nervous power. That this does not take place from an excited state of the nervous system, in all cases, is proved by the fact, that this, in most people, does not occur even when the circulation is most full and rapid, and with a turgescence of the blood vessels; because, here we have sufficient nervous power commonly in existence to keep the whole of the sanguiferous system in efficient play; but, let any one portion if this be weaker than another, then we have it giving way at that part, and we may meet with apoplexy, or other diseases, as the result. Give poisons, however, and the effect may be reversed, reduce the stimulus of bulk from the blood vessels as we please,—we may quell the action, but we cannot allay it entirely in certain cases. Thus, from what has been advanced, I think we may safely conclude, that it is from the balance of the nervous power being destroyed, in consequence of the causes operating in the manner so frequently alluded to, that such a state actually exists in Cholera, in consequence of which we have the more fluid portion of the blood abstracted in

somewhat the same way that a hemorrhagy occurs, without any rupture of the blood vessels.

The stools, in Cholera, when first passed, after re-action has commenced, or been in some degree established, are a little changed, from what they were shortly before this period. They are not unfrequently met with of a black, or very dark green tinge, something perhaps like water in which much flesh has been washed, shewing evidently a gradual restoration not only of the secretions, but also a point of equal importance, the circulation of the blood. The discharges from the intestines, although they may be of a bilious tinge, have not in general the smell which characterises feculent matter. This shews an evident change in the secretion; the more then they deviate, from a white colour, to one of a deeper tinge, so much the better. Does not the light pink colour, which not unfrequently appears during re-action, evidently shew that a restoration is attempted by the balancing power of the nervous system, and that of the circulation?—Do not the blackish stools shew that they are thrown out of the excretory vessels, and that they consist only of blackish blood mixed with the now returning secretions which forms the principal part of the dejections? I have seen patients, who had evidently strong premonitory symptoms of Cholera, just approaching that state in which we might expect a sudden attack, saved at once by the mercury shewing itself in the system; their dejections would then soon after this, assume a most favourable appearance, thereby shewing the great benefit to be derived from a judicious direction of our remedial measures to this particular point. At present, it may be stated, that I do not recollect a case in which the mercury affected the mouth, and in which death afterwards occurred. It is not, how-

ever, for a moment, supposed, that mercury is anything like a *specific*,—it will be found to be otherwise. Even during the change which occurs in the secretions, we may still have the flying pains about the body, particularly in the legs and toes; but they do not, in general, proceed the length of cramps, or the severe spasmodic affections. The bowels are frequently long in a bad condition, even after the mouth becomes sore; during this time, our patients may be greatly annoyed by the flying pains of the legs and other parts, more particularly on the least exposure to cold or damp; and we not unfrequently meet with a sensation of coldness in these parts.

It may be asked why hemorrhagy from the skin does not occur in this disease, in place of the very profuse quantity of fluid which is poured out, resembling perspiration?—Some may be astonished when I say that this is only a hemorrhagy consisting in the abstraction of the more fluid parts of the blood, and not the fluid met with on other occasions—consequently not sweat at all. It certainly ought to bear some analogy to that which is poured out from the intestines, and so it does. But as the vessels of the skin are differently situated, and are also much smaller than those of the bowels, and do not open by patent mouths on the surface, we cannot expect *red* blood to be poured out from these; it may also be noticed that the skin, in consequence of its greater density, resists more forcibly the eruption of bloody particles than the intestines can do. The patent mouths of the perspiratory apparatus are so minute, as under ordinary circumstances, not to be discovered by the naked eye. This, therefore, being the channel through which the fluid comes, it is scarcely to be expected that any thing like the above can take place. But, as we are well aware, this is a channel through which much noxious matter is discharg-

ed, consequently, if it has, in a great degree, lost its power of resistance in Cholera, it will allow a more free escape to the *thinner* or more dissolved state of the blood, when any cause is present of sufficient extent to put it in operation. We need not then be astonished at the vast abundance of the fluid which is poured from the surface, in the more severe forms of the epidemic, and also to be met with in other complaints. The sweating sickness met with in England in other days than our own, may be viewed as identical with Cholera,—as proceeding from the same oppressing cause and may properly enough be placed in the same class. If the cutaneous perspiration be checked and thrown back on the bowels, &c. it is to be expected that it will prove a powerful stimulus in the production of sporadic cases, or other diseases, since it contains ingredients of a deliterious property. Dr. Bostock has given the following analysis of this fluid as found in another disease than Cholera.

Water.....	981,7
Animal Matter.....	4,6
Muriatic of Soda.....	12,56
Soda.....	1,14
<hr/>	
	1000,0

There was also a trace of phosphates and sulphates. “ It is by no means improbable that the cutaneous perspiration may differ in the nature of its ingredients, according to the state of the system, a circumstance which takes place in a remarkable degree with respect to urine, a fluid to which the cutaneous perspiration bears some analogy and with which it possesses some well known physiological relations.” That this fluid, therefore, when thrown back, should prove a powerful stimulus to the intestines, by operating principally on their nerves, is not to

be wondered at, since in this way there may certainly be carried with it other noxious particles besides the above, even when under the opposite circumstances of a pure state ; thus it will come to be the exciting cause of various diseases according to the peculiarities of our patients, but, as the subject is fully considered in the essay on Dysentery, additional remarks are here unnecessary.

As to the urine in Cholera, Sauvages mentions that this is met with *red*, white, or limpid, and that it is not, in general, suppressed. This shews that the disease, under a variety of circumstances, may variously affect the secretions ; although, in the more severe forms, we will find that it is suppressed or very scanty. In other cases, but those of a milder nature, we will find that although this secretion goes on, it is somewhat diminished, this, however, depends on many points, as to the extent of the derangement met with in the other secretions ; for in Cholera we have at least two distinct states of the system one in which they are totally disturbed or destroyed, the other in which they are only in a certain degree impaired ; this is a circumstance worthy of being borne in recollection as it ought to guide us in the treatment. In general, in proportion as the urine is in abundance so much the more chance for our patients, for, as stated, the other secretions may be judged of by the condition of this, which also indicates whether, and to what extent, the system has lost its power of action. We know well that it is to their restoration that we ought to direct our remedial measures, and if they are but partially diminished we have a speedy chance of bringing them soon to a proper performance of their actions.

It has been attempted to be shewn that all the secreting organs of the body depend *immediately* upon the

nervous power for their state of action. The blood, however, must also be admitted to possess some of this stimulating quality although I have attempted to illustrate, that the nerves have the power of directing the whole actions of the animal economy. We are aware that the secretions will go on well in most instances in which the balance of power is kept up between the nervous system and the circulation; but it may also be urged that each of these powers is capable of doing something independently of the other. We know that the secretions of a part will go on for some time, although the nervous power is cut off, but under such circumstances it will be found that these are always, after a short time, somewhat altered and scanty. There is no organ from which we can cut off, all nervous supply, therefore the secretion goes on in diminished quantity or altered in quality in consequence of this. To bring the point to a bearing, I may ask what secretions could we expect to go on in those cases of disease in which the blood has lost its vitality and in which the nervous system has become paralysed in its actions?—The secretions, at least the natural ones, are all impaired in Cholera, many, if not all of them, are entirely suspended. If the above is admitted, I ask in what manner we can account for the vast quantities of fluids that are poured out into the intestinal canal, as evinced by the vomiting and purging. In all such cases, I have said that the natural secretions are impaired or diminished; most will now a days grant that these things exist, it inevitably follows therefore, that we must come to the conclusion that these fluids at least the major part of them, are not secretions, this, however, will depend on the mildness or severity of the attack. These abundant quantities of fluids are derived from the blood it-

self, which is let loose in consequence of a partial or total abstraction of its nervous power; this, therefore, is the manner in which I would account for the immense quantities of fluids which we sometimes meet with not only in Cholera but also in the black vomit, epilepsy, beriberrie and in some stages of dysentery. There is another point to be noticed;—how do we account for the presence of these fluids when the circulation is greatly accelerated. Such states of the system do not shew an equalized distribution of the whole blood,—they only evince the presence of extreme irritability, with a consequently rapid and imperfect contraction of the heart, by which much less blood is actually sent the rounds of the system, than when the circulation is in its natural state; hence, there is much less blood transmitted to the lungs for purification, and the lungs themselves are by no means capable of performing their natural actions, for they also are generally found to be in a state of great derangement. The same cause that operates in producing an irritable state of the heart in this disease, also shews that there is a loss of tone in the other parts, hence arise a congestive state of the larger blood vessels, from which the fluids are now poured out, (for they are ejected *ore et ano*,) and the *suppression* of the *natural secretions*, the abstraction of the nervous power, and the stagnation of the blood, which affords a ready source from which all fluids, not secretions, are furnished; the flow of fluid resembling perspiration is not a natural secretion, but comes from the same source, and depends on the same power for its presence as I have just stated to take place in the intestines. In the same way also would I account for the suppressed state of the urine, or that of the gall from the liver, such taking place from a total or

partial suspension, of the nervous influence, as also from a stagnation of impure blood impeding its operations, which is shewn on dissection by the liver, spleen, &c. being found gorged with black blood. As to the kidneys their power is completely paralysed from the above cause; they have little pure blood sent to stimulate them to proper action. I have thus briefly accounted for the apparent *increase* of the secretions, as discharged from the intestines. In conclusion, I again observe, as to the manner in which the great discharge takes place from the skin, that the vessels of this part have, in unison with the other parts of the body, lost their tone, and consequently allow the more fluid particles of the blood, which circulate near the surface, to run through the excretories; we know also that the very great sympathy which exists between the skin and bowels, is now more likely to be called into action, since the intestines themselves are so much engaged in the disease.

There are cases of Cholera, to be met with not only in India, but more particularly in Britain, in which the bile breaks forth upwards and downwards; these are properly enough designated bilious, for they depend on an increased flow of bile from the liver, in consequence of some power derived from heat, or some other source operating so as to induce a peculiarity of action in the nervous system. These cases are by no means to be dreaded, so much as those in which no bile appears, since such symptoms do not in general indicate a very severe attack; the powers of the body being much above par, will require reduction by the administration of a good sedative—such as colomel and opium. In those cases which commence with a vomiting and purging of biliary matter, we may be sure that there is, in general, a super-

abundance of action, and, although they may be pretty sharp, they are not to be compared to the others. We must take care not to carry our depletory measures too far, especially in India, where we must be on our guard against a liability to the more severe symptoms. In those cases which occur, when no epidemic prevails, we may carry blood letting much further than in those under opposite circumstances. That my opinions may not appear at fault, I have to notice what takes place when re-action occurs in the system after it has been labouring under the more severe symptoms,—bile is now generally soon present. We thus see the reason why bile must be necessarily absent, as we might *a priori* have expected, in the more aggravated forms of the epidemic, and also the reason why its presence should actually indicate a more mild case ; for, with it, there is seldom any blueness of the lips, or under the nails ; when so, we will find that bile seldom returns, until the body has considerably recovered from the sudden shock of diminution which it has experienced. If bile were a general cause of the Indian epidemic, why do we not find all the symptoms aggravated on its appearance when re-action occurs ?

In concluding this account of the various phenomena which occur in the disease, it may not be a great waste of time briefly to re-capitulate the more important points. I now account for the absence, or difficulty of circulation, which not only exists in the extremities, but in other parts of the body, on the supposition that it depends, in a very great degree, on the abstraction of the nervous energy from the parts more immediately concerned. We know that the heart, in the less severe forms of the disease, performs its actions pretty well, and that the blood, in its immediate vicinity, circulates with com-

parative force till towards the close of the attack: when the last stage is present, it quickly loses its action. Why do these phenomena occur? I have already said that water can be obtained for a greater length of time at the fountain head, than from those parts which are removed to a distance from it. Something of a similar kind takes place in this instance, for in proportion to the degree of stimulus supplied, so is the action kept up. If, from any unforeseen cause, a lesion be inflicted on some of the vital functions, so, in proportion, will the parts in the immediate vicinity suffer. It will be easily perceived why the heart continues longest in operation, it is in the immediate vicinity of the nervous energy, and when this is diminished or destroyed, the patient must speedily sink. If the blood is circulated solely by the action of the heart, then the arteries must, in some degree, be inanimate tubes, and consequently destitute of muscular power; none, I believe, will deny that when an artery inflames, there is much irritability of system, this is also applicable to the same state of the veins, and shews that they are possessed of somewhat more power than many may be inclined to give them, at all events that they are possessed of vitality, and are more than dormant or inanimate tubes. Although we have no direct proof that they are supplied with nerves, yet few, I think, will attempt to deny it; they will consequently come to suffer in proportion as the nervous system is more or less oppressed; and, as a necessary consequence, the blood will be less freely circulated. Why, in some cases of arteritis, if they had not a nervous supply, should we have lancinating pains about the epigastrium, and region of the heart, running across the chest, violent pain and throbbing, with palpitation of the heart, and large vessels. The patient, in general dies of *convulsions*, or in a state of complete ex-

haustion and with difficulty of breathing,--the *lips* becoming also of a *purple* color. If the patient lies down with his head rather low, the face becomes swollen. Why should such symptoms appear did they not possess some nervous powers?—The above, in conjunction with another cause, will account for the imperfect circulation.

The respiration is more or less affected in Cholera, the lungs are somewhat diminished, in some cases, on inspection, they have been found collapsed, and lying close to the spine. The blood therefore is in consequence, but imperfectly purified, and from this cause, as has been shewn elsewhere, is never so perfectly circulated as when in its pure and natural state. We see something of this sort occurring in those cases in which the ductus arteriosus remains patent for any considerable time. Here also, we have the blood in an imperfectly oxygenated state, as the venous has access to, and mingles with the arterial, and from the want of a proper degree of stimulus the circulation is languid and imperfectly performed, and the body is but inadequately supplied with nutriment. In Cholera, something of this occurs, the lungs imperfectly perform their office, and the supply of pure blood is diminished; this again has an action on the nerves, and thus all the causes acting in concert soon overwhelm the system. If any are inclined to think with Dr. Hunter that the blood is alive, they may now perhaps have some reason to believe that it must be very speedily killed in this disease.

I have already entered at sufficient length on the fluids ejected from both extremities of the alimentary canal, and also investigated the reason why they are of a greyish slate, or whey colour. The lesion being inflicted on the nervous system, the abdomen comes to suffer most, as the parts contained within it, are more

plentifully supplied with nerves than any other parts of the body, and the sympathetic action, extending to the skin, and other places, causes a sensation of cold. The nervous energy of the blood vessels, from the circumstance of their being less able to resist, are, liable to have their actions sooner impaired. The exhalants also come to suffer materially by a loss of tone, and soon pour out, by their innumerable mouths on the internal part of the intestinal tube, vast quantities of *thin blood*, or the more fluid serous parts, which at length distend, or in part fill the alimentary tube; then the dejections follow upwards and downwards. The fluid *white* blood being thus thrown off, as a matter of course, the portion remaining in the vessels becomes thick, hence another impediment to the circulation; when the fluid matter ejected is more of a red appearance, then the smaller blood vessels must have allowed some of the red particles to escape through their now patent mouths. The reason of the wheyish colour of the dejections must appear evident, from its being the serum of the blood, the flocculent threads, which are not unfrequently seen floating in them, may be the albuminous, or other particles escaped from the blood, deprived of their colour, by remaining for some time soaked as it were in the fluid, or they may be some of the remaining mucus of the intestines. Some may say that the exhalants are inadequate to supply such vast quantities of fluid as we see thrown off. I ask from whence can such be brought into the intestinal canal if not from the blood, what is to prevent the smaller blood vessels, above the size of exhalants, from taking on this action, and thus powerfully co-operating with the others, which are, be it remembered, nothing else but the smaller arteries and veins?—I firmly believe that such is the case, and that it is in this way, that the

system is drained. I lately witnessed a case of transfusion, in which the fluid, after a time, passed from the anus in considerable quantity, somewhat resembling that thrown into the veins. I did not submit this fluid to any analysis, for I was perfectly convinced of the fact of the near resemblance, and considered that little practical information could have been derived from such an investigation, a very considerable proportion of this was passed, and continued to flow from the anus so long as the transfusion was persevered in. I do not like the idea which those men must have, who swallow the black vomit of a patient, in articulo mortis, in order to convince those around them that the disease, inducing such a state of the system, is not contagious. From what has been advanced, I think that we may safely conclude that the smaller blood vessels have, in a very great degree, lost their tone, and that it is in consequence of this that the more fluid parts of the blood are abstracted, these smaller blood vessels acting the parts of syphons, will to a certainty, if allowed, soon empty the blood vessels, and likewise the system of all the fluids that may pass through them.

As to the spasmodic actions shewn in the different parts of the system, more particularly in the extremities, and the intestinal canal, little more need be stated, since those transmitted to the muscular parts may be viewed as the effect of an undue stimulus, at times shot forth along the nervous cords from the centre of the nervous power,—the abdomen containing parts of the utmost sensibility, suffers in consequence. Irritability of system, more particularly as manifested by the stomach, is generally, if not always, present in diseases, and considerably affects the different viscera. There is another item of some importance,—it is the strongly depicted

Hippocratic face, this is also to be met with in those diseases which materially and quickly afflict the animal and vital powers. As to spasmodic affections of the extremities, they also suffer from a similar cause, viz. a rapid shock communicated through the medium of the larger branches; this shock is perhaps more than the system can withstand, for the parts, weakened as they now are, are easily made sensible of any untoward action; this once begun, is kept up by the muscular fibres acting more or less powerfully according to the strength of their stimulus, or that of their *vis nerveia*, or *vis insita*, &c. These parts being now in a debilitated state, are consequently less able to resist, and the impression once made causes the muscular fibres to swell up into lumps or hard knots; they will continue in that state until the action is exhausted, when they will again relax; now from this they have suffered a degree of laxity, and when another impetus is communicated along the nerves, they will be again brought into the same condition, and be still further reduced;—in this way then, from a repetition of the same process, the system at length becomes so weak that it cannot transmit any of these impressions, and the parts, from being in such a condition, cannot take on the action, even although such were sent; that this supposition may not appear unreasonable let us, for a moment, turn our attention to what occurs, either during vomiting, or when our patient gets up to go to stool. Does the severity of these not continue according to the extent of the vomiting or purging, and do we not see that the least tendency to such will bring them on, or back again when they have disappeared?—Do we not, when the patient at times attempts to get up, meet with syncope in the more severe forms of the epide-

mic?—even this while at the commode, when the spasms may be removed. The first is always a very bad omen, as it shews such a great deficit of the sensorial and animal powers. Let us look to the effects produced by galvanism or electricity on the nervous powers—as when applied to criminals immediately after execution. Do we not witness violent spasmodic actions produced in various muscles, and continuing in operation so long as the wire is applied, or until the body loses a certain portion of its heat. Any one can easily see the same thing upon the bared muscles of the leg of a frog which has been newly killed, by applying a small galvanic apparatus to the nerves of the part: these being touched by any thing capable of giving the proper stimulus, the fibres of the muscle will not only be thrown into action but will continue in that state for a short time after, until the impetus communicated from the apparatus is expended, or the parts so *cold* as not to be acted on. I have witnessed the same sort of action in cases of Indian Cholera, where, after the respiration and the action of the heart had, for some time, ceased, there were to be observed involuntary actions of the muscles of the thighs, particularly those of the inside, as also about the arms and legs, the mouth, particularly the orbicularis oris and ligomaticus. The explanation of this may be as follows,—the nervous power is not as yet entirely expended, even although the patients are dead, and the slight shocks continuing to be transmitted through the medium of the nervous cords, which act as conductors, and the volatile fluid, or of whatever other nature it may be being communicated to the muscular fibre, which is now thrown into activity, stimulates the parts in its vicinity, and a spasmodic effect is produced, more or less intense according to the sensibility of the mus-

cles ; we must also remember that each portion of the body is in some degree dependent on another for its maintenance. In support of these opinions, I have to add that we never meet with severe cramps in the latter stage of Cholera, especially when the disease has been of some duration, because the parts are now weak, and the nervous power is almost exhausted.

The state of the *diminished* secretions comes now under review, these will not detain us long if we consider that all the secretions come from the blood ; and, as we have seen, a *drain* of the most deliterious nature is established along the intestinal tube, we cannot therefore expect to find the secretions of the body either natural in quantity or quality, such then will account for the suppressed state of the urine, &c. We need not be much astonished at the increased perspiration when we take into account the well known sympathy which exists between the skin and bowels, and consider that the exhalants of this part, as well as those of the other compartments, have lost their tone, and from a similar cause, as already stated. It has been observed that this is not a secretion but another fluid, therefore the perspiration is *diminished* as well as the rest. In diseases which speedily assail the vital powers, we observe this secretion poured out in abundance, this may also occur from excessive mental anguish, for it tends, in a great measure, to relax the tone of the small vessels of the skin, it may also proceed from the well known action of real fear or dread which we occasionally witness in those possessed of little nerve, or in the superlatively brave, when placed in *apparent* danger only, such quickly reduces the animal powers, and in particular those of the nervous system.

It is thought that enough has been now advanced

with reference to the cause of this particular epidemic, as also that of others, as regards the various appearances to be met with in Cholera:—the sporadic cases, as well as animalous appearances, have been accounted for—and it is to be hoped, that the statement has been fair and candid, and that these are now reduced into something of a tangible shape. I have no where passed over any question in a superficial manner, I have aimed at a minute enquiry into all the occurrences and if unsuccessful in my attempts, laborious as they have been, under the circumstances in which I have been placed, there is this consolation at least that none else can be lost on the same path—“out of evil cometh good”—I may be told that some of these opinions savour strongly of a new hypothesis of the epidemic, this requires no commentary. Well, if they do, what fault has been committed?—are we not in the search after *truth*?—are we of the present day, in the prosecution of our investigations, to be blinded or prevented from following this almost impervious road?—no. I do not like the idea of travelling old and beaten tracts, such in general, are so rough and dirty that we can get but indifferent footing. I know well the import of the expression—*non quo eundum est, sed quo itur*—and fully appreciate it. But it may be observed that the path of truth is open to every one, and he who enters must always be prepared to encounter unforeseen difficulties, since it has so many turnings and windings, each so exactly resembling the straight forward one, that if we do not take care we are as likely to take that by its side as the main path which ought to conduct us on our journey. The tract of these observations, at least of many of them has not, in so far as I am aware, been traversed by any one: since the road is now so old, and the obstacles

so many, in the search after the laws of Nature, he who undertakes such must be prepared for the worst. The present, it is thought, is a good opportunity of safely entering upon the journey, and although a long one, yet for the greater portion of the way, we have had firm footing, and such a solidity derived from its very age, as not to be easily overturned: none therefore need be afraid of proceeding, although he may be lost in a quagmire at the end of it. It is now proposed to make some observations as to the treatment; here it will be found that we have much to contend with, the more especially as we know that almost every remedy of established efficacy usually employed in disease, either in a simple or combined form has been had recourse to in Cholera, and with no better chance of success than those of former days, particularly when the more malignant form is to be encountered.

C H A P. XI.

TREATMENT.

There is evident proof, from the cases which I myself have witnessed, as well as those detailed by others, that the main spring of our actions should be directed to the proper establishment of the secretions. This is a law that should serve as a guide in forming our plans of general treatment. These, however, as they depend on the regulation of a power or powers that are chiefly overwhelmed in the attack, cannot be accomplished until such are set in motion. It is not one secretion alone that we have to restore, for it has been shewn that the urine, the bile, the natural secretions from the intestines, the perspiration, the saliva, and every other secretion in the body is entirely sus-

pended, in the more severe forms of the disease. Their restoration can only be accomplished by a due distribution of healthy blood, for, as shewn, all of them depend on this for a maintenance of their healthy or diseased actions. I say nothing at present with respect to the nervous power in this, but go on by observing that the more the blood is disturbed in its visits to the different parts, the more will the system be oppressed, and, in proportion as it is locked up in the body, by any one secretion being in default, so much the more will we find it impaired in its powers of healthy stimulation, this tells forcibly on the different organs, for they suffer to the extent that the blood is rendered impure. It is therefore useless to talk about restoring one secretion before another, in diseases of such a nature this cannot be done, at least at all times; let us have the blood moving more fully and freely, then we may have them all and at once set in motion, or they may be injured according to the extent and duration of the former detrimental cause. There are cases to be met with which would soon assume a truly severe form, unless the balance of power were happily restored, at this critical juncture;—it may be accomplished by the administration of mercury or gentle stimulants. This, as a matter of course, is in many cases effected with the utmost difficulty in consequence of the overwhelming injury that has been inflicted on the sanguiferous, but more especially the nervous system. These two functions may be viewed as those primarily assailed, and in proportion to their lesion, so will the mildness or intensity of the case be. Even granting that we have the secretions in a great measure established, it is as we know a difficult matter, in very many instances, to keep them, even for a limited time, in proper trim, since the powers of the

system are extremely apt, on the least unnecessary interference on our part, or that of the patient, to fall back to their former threatening condition, this they are more predisposed to do, at this early period, in consequence of their previous lesion ; for we in general find that a disposition to the renewal of the attack is manifested during the epidemic cause, even when we adopt the most vigorous treatment. This liability to relapses may be manifested even during convalescence ; we see it evinced by a partial renewal of the spasmodic actions in the toes, legs and arms, and this is the more likely to occur if there is a sudden change in the state of the weather from hot to moderately cool breezes, or even from the circumstance of throwing off the bed clothes during sleep, and allowing the exposed part to be acted on by the *chilling* effect of the night air, or the damp that may be present in it, independently of any other circumstance connected with the state of the atmosphere. These occurrences are particularly liable to take place at sea, and I have seen them in several instances, and felt the very circumstances stated above a source of great annoyance to myself on the least exposure ; the nervous power of one side of the body was, at one time, so much impaired as to make me dread a paralytic affection, and the annoyance continued for months after. I have stated one case in which a fatal relapse occurred, during convalescence, from this cause alone. After recovery we will find that the bowels are extremely torpid and difficult of regulation ; I have met with cases, in which this irregularity existed for many months after, and there were some who did not get rid of it for eight months, at least ; such evidently shews that when a secretion, such as that of the alimentary canal, is seriously disordered, it is again regulated with the utmost

difficulty, even after the circulation of the blood has been properly established.

There are other points of general importance to guide us as to the treatment,—such as the space of time our patient has been labouring under the disease, and the circumstances under which we have to treat him; these will be immediately considered. “The chances for a patient receiving benefit from medicine diminished in proportion with the increased duration of the attack.” We ought also to bear in mind that few of the Native Indians have ever recovered without medicine; almost all, if not all, have died, who have not had some medical assistance; I say nothing as to Europeans for the deduction is natural enough. Thus we see Medical aid, as well as an *immediate* removal from the place in which the disease prevails, is of the utmost utility. And this last is a point of paramount importance in the treatment of Cholera, and all other epidemic diseases. Our patients should be removed, as speedily as possible, to elevated situations, since here they will be in a great measure out of the more immediate effects of a concentrated state of the atmosphere, which constantly, and almost necessarily exists on the surface of the earth. We all know of the famous cave in Spain into which if dogs enter they are sure to die, while man, being taller than these animals, escapes; this arises from the circumstance of his breathing a comparatively pure, air, that which is impure being collected a foot or two from the surface. Hence, by removing our patients from the immediate sphere of the disease, as it exists on the low grounds, to higher situations, we will save many lives. If the disease appears on elevated situations from the cause being in operation there, we, of course, remove them to some other, whether this be

higher or lower. We must observe an especial caution in the erection of any temporary Hospital, with a view that it may not be placed where any sudden variation of temperature is likely to occur, such as that proceeding from a calm to a strong breeze, or where the wind may come from the immediate seat of the disease, we must always if possible keep out of the sphere of its action. Hence placing an Hospital on the point of a rock close to the sea, must generally be improper; for here we have a change of temperature greater by night than is consistent with that during the day, and from this cause alone we may have many deaths, at all events much more disease even arising from other sources than that of Cholera, or we may have long and protracted cases of convalescence (probably ending in dysentery,) which are extremely difficult to manage, so long as our patients are exposed to the prevailing cause of atmospheric vicissitudes. I firmly believe that this alone as a cause produces many of the dysentric attacks which are yearly met with amongst the Soldiers stationed at Trincomalee, at all events that it always renders them of much more difficult management than they otherwise would be. The situation of the Hospital on a rock all but jutting out into the sea is, as a matter of course, extremely unfavourable to cholera patients. Care, on the other hand, must be observed not to crowd too many people together as was formerly the practice on board hulks, else here also we may expect many deaths, and severe cases from accumulation alone. Such are far from being merely precautionary measures, as could be fully illustrated in every quarter of the world. By avoiding these things therefore, we may do much good and save many lives, which would otherwise fall victims to the epidemic, always keeping in mind to avoid extremes, and select the

most healthy spots, provided this can be consistently done with respect to those in health or disease. As the operating cause of Cholera, and some of the other more fierce epidemics, continues only for a short period—for three or four weeks, and often less,—it might be a point in our precautionary measures to remove the troops about this time, (which may be about the change of the monsoons,) to a place in which the disease is not likely to prevail. By this means we will not only, in a great measure, avoid Cholera, but also other endemic or epidemic diseases which are liable to prevail about these periods, and if we balance the expenditure of sending “more men from England” with that of the removal, we may find the latter by far the more preferable measure.

That we have failed, in a great degree, in the treatment of cholera, especially in its more malignant forms cannot be doubted. It will be found, in the prosecution of this enquiry, so far as regards the medical part, that this has been owing to the circumstance of not attending to the proper laws which ought to direct us in this respect. Although I do not agree with Dr. Maclean in many points, yet I cannot help introducing the following quotation, as illustrative of one of the causes of our unsuccessful proceedings; at the same time, it is admitted that, in a great proportion of the more malignant forms of the attack, our remedies, for fulfilling certain indications, are perfectly inapplicable, from not being possessed of adequate power, or from their misapplication, as when employed at a too advanced stage; but this point will afterwards fall to be considered. The author alluded to, states, in rather concise sentences, what may be considered as very applicable to the present disease, and none need be afraid of bringing before the Public the fol-

following paragraph. " It also appears, from a strict ex-
 " amination of the modes of treatment, which have been
 " described as having been pursued upon each of these
 " occasions, that too frequently, the least injurious con-
 " sequence which could have been expected to arise from
 " them, was that they should prove simply harmless.
 " These modes of treatment may all be included and
 " characterised under the four following heads. 1. Sim-
 " ply inefficient, from inertness of the remedies applied,
 " or from the application, in a different degree, of agents
 " of an adequate power. 2. Indirectly pernicious from
 " the remedies producing by their misapplication, new
 " disease, equally, or more severe than those which they
 " had been employed to remove. 3. Directly pernici-
 " ous from the increase of pre-existing disease by the
 " positive diminution or direct abstraction of the ordi-
 " nary exciting powers as the blood. 4. By the pre-
 " posterous combination of directly debilitating, or di-
 " rectly stimulating means, an effect either noxious, or
 " salutary, but quite uncertain, must have been pro-
 " duced according to the former, or the latter of these
 " agencies had happened to preponderate ; as in the
 " conjoint employment of blood-letting and mercury.
 " One or other of these descriptions or combinations of
 " them, will I conceive be found to comprehend every
 " species of medical treatment which does not consist
 " in the due application of principles. The results
 " upon all these occasions, both in respect to the pre-
 " vention and to the cure, have accordingly been as
 " might have been expected, and will always happen
 " when the state of the atmosphere, the condition of
 " the countries, the circumstance of the population, and
 " the means pursued are similar." So would I be in-
 clined to say, and now let any medical man conscienti-

ously state if he could properly apply the principles of his profession to a disease which has hitherto remained wrapt up in such mystery ; can any one, I ask, apply proper rules to a subject which he does not comprehend, and which has as yet remained enveloped, as it were, in a large and mysterious shroud. He may adopt a proper treatment, but he can only do this accidentally. Why should such men be too proud to apply the above to themselves, and to acknowledge that they have not as yet the means of effectually overcoming this inveterate disease ; nay, some may even add, give us all the medicine in the world, and we will never be able to conquer all complaints. Let us find antidotes of sure efficacy for the various poisons, and we may find some that will prove effectual in this ; but unless we can do so, it will be of no avail. We have not therefore, at present, the sure means of fulfilling the indications required in every case, these consist in *primarily rousing the nervous energy, and thus keeping the circulation alive !* this is the point to which we should direct most of our attention, especially in the more severe attacks, at present we only see these measures through the inverted end of a telescope, and although removed to a very considerable distance, yet the indication is distinctly within our view, and time may bring the object nearer and bestow on us remedies for attaining it. I hope, however that none will be apt to imagine that we are, at present, without the power of ameliorating the symptoms, and very possibly of effecting a cure. If any such exist they will fall into an error which equals in amount twenty thousand times the damage that can possibly arise from embracing the other opinion—such comes from an error in judgment, and may cause death to thousands—“ In the repetition of the

“ doses of remedies, for the cure of diseases, we have a
 “ striking example of the dread which is entertained of de-
 “ viating so far from the usual routine, or prejudices of me-
 “ dicine, as to wander into correct application of a princi-
 “ ple. It is one of the most fundamental, and most exten-
 “ sively useful principles of medical sciences that the doses
 “ of remedies should be administered at intervals equal
 “ to the duration of the action of each dose. The exact
 “ observance of this rule is indispensable, first to the
 “ cure of the original disease, and next to the prevention
 “ of new diseases, which would otherwise arise from the
 “ diminution, suspension, or cessation of the action of
 “ the remedies. If two hours be the estimated period
 “ of the duration of the action of each dose of any
 “ agent, it ought also to be that of the interval between
 “ the successive doses. Some who are bolder may be
 “ induced to repeat them every four, or every three
 “ hours, but the number of those who by repeating
 “ them at intervals equal to the duration of each dose,
 “ will venture to embrace a perfect principle, is extreme-
 “ ly small. In approaching the point of correctness,
 “ they seem as if they were approaching a precipice.
 “ Practitioners I have had occasion to observe, have also
 “ sometimes committed an error on the opposite extreme
 “ in the repetition of the doses at intervals shorter than
 “ the duration of the action of each dose ; and this al-
 “ though not of so dangerous a tendency, is as a devia-
 “ tion from principle, also equally to be avoided. All
 “ the existing powers commonly called remedies are
 “ known to be capable by their misapplication of pro-
 “ ducing diseases as severe as those which by their
 “ due application they are capable of curing. Far other-
 “ wise is it with him, who applies principles to practise,
 “ he calculates, combines, and proportions his powers.

“ according to known laws, and applies them in such a manner as to produce certain given effects.” Such then is a brief statement of the views which ought to guide us in the successful treatment of many diseases, besides cholera, and the more they are attended to, the greater will be our chance of ultimate success.

By removing the spasmodic actions we will find that we also give a quietus to the vomiting and purging, this is a point of the greatest possible importance and is the means adopted by very many, as the only indication perhaps in the treatment. The manner, in which this unquestionably desirable object is to be accomplished, is of much more moment than many may be inclined to imagine, for perchance, with it we will have induced a state of the system that may be either favourable to recovery, or, on the other hand, allow the remaining native strength to glide imperceptibly to decay. In the more severe forms of the disease, we observe that the spasmodic actions, as well as the vomiting and purging, generally abate about an hour or so before dissolution, this, in such cases, takes place from the very fact of the nervous power being wholly expended, suspended, or so far overpowered from a continuance of the actions themselves, or that state induced by a superabundant administration of the remedies, of two oppressive powers, as totally to destroy them. We want a something therefore to keep them a going, and thus impart a new energy to the nerves or keep up that which is already in existence. It is therefore a point of the greatest importance to determine what it will be proper to administer under all stages and conditions of the disease in order to quell these inordinate actions. In the class of cases referred to, sedatives, of a powerful and lasting operation, should be carefully avoided, and we should only administer such

as are capable of producing a sedative or quieting effect, with a stimulant tendency. Another question, in these instances, is ought we as soon as possible, or at once, to endeavour to stop the continuance of such active and overpowering proceedings as the spasmodic affections produce on the body? I certainly think that in all cases the earlier this can be judiciously accomplished, and with the least expense to the active powers of the system, the better, seeing that, by remaining in active operation, they will soon exhaust the vital and animal powers, for we know that such powers of the system are as effectually worn out, or perchance much sooner expended by their continuance than they would be by our remedies if properly employed. It is, therefore, a nice and most important point to quell these inordinate actions as soon as possible, by employing such means as are the least likely to interfere to any considerable extent, with the remaining vitality of the nervous system. How far will blood letting do this? Under what circumstances is it to be had recourse to? In what stages of the disease is it usefully employed? as well as the other general views which are to guide us in its employment, now fall to be considered in the following Section.

SECTION I.

BLOOD-LETTING

The testimony of authors as to the utility of blood-letting is various. There are some who place their whole reliance on it, and seldom allow a case to slip by without trying the sharp edge of their lancets, there are others again, who shake their heads and say it is bad practice. We must always bear in mind that we cannot replace the blood in any case, if once withdrawn, unless through the tedious process of digestion, and that thi

is of very difficult accomplishment in a weak patient. It is therefore of the utmost consequence that we should consider well the nature of the case, the constitution of our patient and many other points ere we have recourse to this remedy. We may not unfrequently meet with cases in which there is a protracted convalescence merely from a deficit of the blood that has been abstracted, and which is so necessary to recruit and refresh the whole functions of the system ; for by this means we may have a new condition induced, and during the time that we are waiting for the rallying of these powers by a replacement, another disease of perhaps an equally formidable nature occurs ; or, if not, we may have severe and protracted cases of convalescence. The abstraction of blood then is a point of no mean consideration, it is not to be treated with that sort of cool indifference which we so very frequently meet with amongst certain classes of medical men, particularly those of bombastic pretensions. Oh ! say they, the losing a little blood, with a nod, and cunning leer of the eye, can be of no harm, for it must soon be replaced ; begging of these gentlemen pardon, I do say that the losing a little blood, when injudiciously and indiscriminately had recourse to, is of the utmost importance ; do we not see such men lose a very great number of their patients ?—I would say from this cause alone. The abstracting blood in a disease of this nature is not such a light point as they are inclined to make us believe. The discriminate use of the remedy requires a nice acquaintance with the powers of life so far as they can be ascertained. I could quote various authors as to the utility of blood-letting. Dr. Jukes observes, “ without at all adverting to the origin, or immediate exciting cause “ of this very formidable disease, it must be quite evi-

“dent to every common observer, that if the blood which
 “now fills the vessels and warms the extremities, should
 “from any cause be suddenly withdrawn from them, it is
 “not annihilated. It is not now in the superficial veins, for
 “they are collapsed; the pulses at the wrists have ceas-
 “ed to beat, or beat very languidly; and in short, the
 “sodden appearance of the hands and feet at once be-
 “speaks the abstraction of the vital fluid from all those
 “parts.—Before I had to combat with the disease, I
 “was very sanguine, and thought that the early appli-
 “cation of caloric externally and internally, while I
 “abstracted blood largely to relieve the congestion of
 “the internal parts, which I believed to exist, would be
 “attended with the happiest effects, and I *almost fan-*
 “*cied might supercede even* the use of calomel and
 “opium.” The first part of the quotation, is in some
 respects, certainly a fair deduction; but I must say, one
 of the most appalling errors that a medical man ever
 fell into, would result from an indiscriminate use of the
 lancet. It is a species of logical deduction, erroneous in
 the extreme, which if put into full operation, and to
 the strict letter of the law, would prove the death-blow
 to thousands, and destroy more in the severe forms
 of the epidemic than we could ever hope to save—
 I was about to add even taking every case into con-
 sideration, from the most simple form of the disease to
 its most malignant species, such however would be
 rather a too hasty conclusion. If there is a dis-
 ease in which blood-letting, when improperly applied,
 will do irreparable damage it is certainly this one, as I
 shall in a short time attempt to shew. The second part
 of the quotation is a species of reasoning not un-
 frequently to be met with,—more apt to mislead than
 instruct. This proceeds from the non-application of

principles to practice, which some do not sufficiently attend to from the time of their leaving College, or even during their course of study. Had attention been paid to the phenomena of the disease, errors of such magnitude could not possibly have crept into the general practice, even of the routinist. My reasons for condemning this so much will afterwards appear when I come to treat of the warm bath. Dr. Jukes says there is nothing more immediately stimulating to the arterial system than heat, and hence the hot bath is strongly indicated and my own practice substantiates the truth of the theory." Now had he informed us under what circumstances he had had recourse to this remedy,—at what period of the complaint, and the thermometrical change in the heat of the body, we would have been enabled perhaps in the present day to use as unqualified language as he does. We will find that there is a medium of temperature to be adopted, for, if the bath be too hot, it will certainly overpower the strength of the constitution.

To return to our subject Dr Burrell "clearly proves, that
 "at the *commencement* of the disease in Europeans, blood
 "letting is the sheet anchor of successful practice; and
 "perhaps also in Natives, provided it be had recourse to
 "sufficiently early in the disease; and as long as the
 "vital powers remain, so as to be able to produce a full
 "stream, it ought perhaps never to be neglected, it hav-
 "ing been sufficiently proved, that the great debility so
 "much complained of, is merely apparent. Calomel as
 "a remedy, certainly comes next in order, and when
 "employed in proper doses, with the assistance of opium,
 "and more particularly in the more early stages of
 "the disease, seems to be equally effectual among
 "Natives, as venesection among Europeans, in
 "arresting its progress.—All other remedies must

“in our opinion be considered mere auxiliaries”—
 Bombay Reports—The Bengal Reports give a somewhat
 different account, and do not seem so *sanguine* in the
 treatment. “In Europeans generally, and in robust Na-
 “tives, bleeding could be commonly practised, where
 “the patient was commonly seen within one, two, or
 “perhaps three hours from the beginning of the attack,
 “and in all cases in which it is resorted to under such
 “favourable circumstances, it was more successful than
 “any other remedy in cutting short the disease, usually
 “resolving spasm, allaying the irritability of the sto-
 “mach and bowels ; and removing the universal depressi-
 “on under which the system laboured—amongst the ge-
 “nerality of Natives, the depressing influence of the dis-
 “ease was so powerful and rapid in its operation as almost
 “immediately to produce a complete collapse, and near-
 “ly destroy arterial action ; and therefore to render ve-
 “nesection for the most part from the beginning imprac-
 “ticable. Although it cannot be affirmed that calomel
 “possessed any specific power in checking the disorder,
 “it was undoubtedly frequently useful in soothing irri-
 “tability and was perhaps of more certain sedative ope-
 “ration than any other medicine.”

Now, after the above lengthy quotations, we may ask
 what are the advantages to be derived from blood-letting
 in any stage of the disease ?—I admit that it will relieve
 the spasmodic affections, and that it consequently acts
 like a sedative, but it is a sedative of the most powerful
 and determined sort, and if too much has been withdrawn,
 there is perhaps nothing that we can employ that will rouse
 the nervous system, and, in conjunction with this, the cir-
 culation. Bleeding therefore is a powerful sedative in
 the disease, and acts particularly on the nervous power,
 by reducing it to a *low* condition. The brain, as well

as every other part connected with it, at all times depends on the healthy state of the blood for a proper performance of its actions, so that, by abstracting from that which is now actually circulating in the system, we will do irreparable damage. In those cases, in which the attack is severe, will bleeding, at any period, tend to prevent venous congestion? or will it remove this when present—as in the more advanced stages of the disease? I should think that bleeding at the *very commencement*, will certainly, in some measure, counteract the tendency to such, and that we may thus turn the tide of affairs in our favour; this, however, more immediately applies to the less severe forms of Cholera, for we will find, when such congestion has formed, that venesection will not do so, but will only give encouragement to its increasing. The reason why it will not do so is simply this, there now exists a *torpid state* of the heart, and greater blood-vessels, as well as of the nervous power, which venesection is calculated rather to aggravate than relieve. Cholera is a disease *sui generis*, and differs almost entirely from others in which venous congestion occurs, for in these it is a fact that the heart and large blood-vessels are oppressed merely from the onus of the blood being, from some cause or other, directed to the more internal parts, and the nerves, although they may have been the primary instigators of this, now come to suffer from the presence of the additional load—the heart also becomes irritable in proportion to the extent of the evils, *first* from an irritated state of the nerves, and *secondly* from the congested state of the veins, which it cannot get rid off, at least for some time, or until we abstract blood; by doing so we give relief to the heart, as well as the nervous system, which, although oppressed, has all the time continued in opera-

tion, and ready to take on action the moment the oppressive cause is removed. This however, is entirely different from what takes place in Cholera, after it has been for some time in duration, for here the deadening cause continues so that blood-letting, instead of removing must rather tend to increase it: whereas, in the other instances, the cause, is by no means so powerful as it is in the latter, since it only induces a torpid or inactive state which continues for an indefinite time; and we will find that the system soon becomes restive from having its innate powers oppressed, but not destroyed, and endeavours by some means or other to expell the enemy. This then forms the grand difference, that in those instances, in which venous congestion occurs, from other causes than those capable of acting like poisons when admitted into the system, there does not exist so great and universal a tendency to the *destruction* of the nervous power; in these it is only *oppressed*, and being relieved, the powers of the body come again into full play; but, in Cholera, and other cases of poisons, the *nervous power being greatly injured or destroyed*, it should follow that we cannot expect any good from phlebotomising our patients under such circumstances. By bleeding, therefore, in other diseases, in which venous congestion is present, we remove the load of blood from the more internal parts, and, in particular, from the heart itself. This being the propelling power, will, as a matter of course, at once, feel the impression and being relieved, together with its nervous system, the circulation goes on in somewhat the same proportion as we see exemplified in those cases in which the pulse continues up after venesection; what is apt to occur now?—there may be a state of re-action induced from another cause, and we may require

to bleed again to bring it down. If the system were not generally relieved in this manner from the additional load, we would have an increase of the disturbance, for the blood now acting as a weight, and from its bulk alone, giving a stimulus, to the whole system, would induce a tendency to re-action and this taking place there would in all likelihood be either what has been called a critical discharge, as a profuse perspiration, or a purging, or a hemorrhagy, either would moderate the quantity, or take off that stimulus from bulk; and with a return of the natural warmth of the body there must also take place a more free distribution; this is managed by the nervous power being so strong as to cause an equable adjustment of the whole; at times, it may so happen that in its endeavours to do as above stated, other diseases will occur somewhere in the body, this arises from an over-excited state in a particular portion of it, and from the non-efficient resisting power of that in its immediate vicinity. I shall soon have occasion to point out the reason why the blood forsakes the more external parts in certain fevers, as well as the other points to be attended to.

It may now be mentioned that it is certainly bad practice, especially in hot climates, to bleed in the more *fixed cold stages* of any fever. The patient, in my opinion, should always be somewhat comfortable as regards his sensations,—not by any means very chilly or cold, and we ought at all times to have a pulse, which is not *fluttering* or very tremulous, there should always be a sort of *re-action* in the system, ere we venture to abstract blood, if we have lost the favourable moment, at the very commencement of the attack. I am well aware that these opinions run counter to those of others, as to the propriety of bleeding in

the cold stage of fevers, especially in those of the intermittent type ; this cannot be avoided, for I give, as it is my duty to do, a plain, fair, and candid statement as regards the proper plan of proceeding : our rule should be, provided we have lost the opportunity at the very formation of the attack, not to bleed in any cold stage unless there is action in the system, as evinced by the state of the skin, which ought always to be moderately warm, with the pulse neither very feeble, small, quick, nor fluttering ; by acting otherwise we may do irreparable injury. I know, and fully admit the utility of the practice of blood-letting in other diseases, when the state of the system seems evidently to demand this remedy ; what I am adverse to is an improper and ill-timed application of the lancet ; the instances, in which this cannot be depended on, as a salutary means of relief, I have noticed above, for we will find them to be those in which there evidently exists a deficit of action in the circulation, produced by a transiently destructive operation on the nervous energy. It would be singular indeed if all authors were wrong as to bleeding in the cold stage of intermittents ; there are some who give instances in which all who were bled in this stage *e vita decessit*, while the majority of those who had been differently treated in this respect recovered, although all had been under precisely the same form of general treatment.—It follows that we should be extremely cautious in the use of the lancet, under such circumstances, and, that if we must bleed, we ought to do so at the proper period. Here we will find, in hot climates, that Europeans bear blood-letting well, but then this is when it is judiciously employed. When any one bleeds in the cold stage of fever, especially in the intertropical climate of the East, under what circumstances does he do so?—

with every chance of benefit resulting from it. Every one may grant me that there existed a deficit of action, from which the above patients, who died in consequence of the mal-practice, could not rally. The reason may appear more plain when we consider that, in such instances, a state of low vitality, quite incompatible with the patient's recovery, must have been induced either by a continuance of the same state of the disease, or by the production of a new one. If our patients recover, when bled in the cold stage, they do so under the following circumstances,—they may have been bled at the moment re-action was about to establish itself, or the paroxysm of the fevers may have been neither of long continuance, nor the disease itself severe, and the duration of the cold stage may not have continued long, perhaps been so slight as to escape notice; such cases we not unfrequently meet with. It is not intended to call in question the principles of any one on this particular point, otherwise than by stating that the proper laws have not been laid down by authors, or if so, that they have not been attended to; none have done so with sufficient minuteness and accuracy, and I do distinctly observe that few of them have taken an extensive view of the merits of this question. They ought to have given a more distinct statement of the difference which exists in bleeding at any particular stage, than they have done, and have shewn us the time when it might be advantageously employed, as well as that must when we were *not* to interfere in this respect. I am also convinced that any one who takes a modern work into his hand,—studies the paragraphs on blood-letting in cholera, and some other diseases, cannot but feel very much discontented with the result of his investigations. There is but little difference made by some between

the mild cases, and those of an aggravated form. One author says, bleed at the very commencement, but he does not say whether we may again do so with advantage ; another tells us to bleed when we can get blood to flow, for it is the only way in which the venous congestion can be removed, and a third, or fourth, may say a something else. I am somewhat unwilling to wrestle with these modern Leviathans, knowing well that I stand but a poor chance with them ; I will stand by what has been advanced, however severe as their animadversions may be. These men, be it recollected, have strong possession of the minds of the medical world, and, in many points of view, they are entitled to it ; thus little advantage would accrue from urging this important subject farther, than to solicit the strict attention to this article which it evidently deserves—life or death is in the remedy—they are but men, like myself, with this difference that I am young, while many of them have the matured faculties of advanced life. Medicine, especially in the present day, is not at a stand still, for we will find as we already know, that it is only by progressive improvements that we can arrive at the acme of perfection, which, as may be predicted, will not occur in our time.

It is only the search after truth, that has induced me to make the above remarks, let none therefore imagine that I want to stir a nest of hornets, or introduce any thing like innovations, even were it possible, which will not stand the test of every medical man's experience ; but to return to our subject. We are aware " that every paroxysm of fever is *terminated* by some evacuation from the system, whether by perspiration, urine, increased secretions, or of some local hemorrhage" and that this is the manner in which nature takes to relieve herself. But

to the point at issue, as it is not at the *commencement*, but the *termination* of the paroxysm that this takes place, the question is, will bleeding early prevent such an occurrence? I here more particularly allude to the *cold* stage, and the time during which it continues; it is imagined that it would be beneficial, but what have we gained by interrupting the sanitory efforts of the system, for in many cases we may have done *more* than is required to moderate this or that action, if so—will we not have done harm? The moderation of action is all that we should ever aim at under such circumstances, otherwise we can do no good, and surely the proper time for doing this is when we can safely determine, from the steady state of the pulse, how much of the vital fluid can be spared for the relief of the system. In a disease of the nature of Cholera, in which the sanguiferous system is much oppressed, and certainly weak, especially in its more advanced stage, what benefit, let me ask, can be derived from still farther moderating an action that is already but too apparently under tone. Nothing it is believed, can be gained by such a proceeding, but does it not rather necessarily follow that we run the chance of producing death more quickly? It is not, however, so much against the practice of venesection that I venture to plead, or give an opinion, as to the *proper* time when we should have recourse to the remedy with most chance of doing good, either in this disease, or in the cold stage of fevers. If such are ever to be cured by blood-letting, it must be at the time when action or re-action is sufficiently strong to warrant our interference in this respect, which seldom or ever actually happens in the *true cold* stage of any fever, especially when this has been of some duration. If then, the practice be prejudicial in the cold stage of such fevers, how much more damage must be

committed in those cases in which such has actually taken place, when attended with an all-overpowering action in the nervous system, that cannot now be relieved, or brought to re-act by the abstraction of as much blood as can be obtained: we shall find that our patient suffers in proportion to the quantity abstracted from the circulating medium. In the above observations I do not allude to bleeding *before*, or *after* this particular state of the system has occurred, with the especial precaution, however, that we do not overstep the bounds prescribed, and that we do not lower action too much, else here also we do irreparable damage. These points must depend on a vast variety of circumstances; I therefore, proceed with the investigation of this important subject, under the thorough conviction of the bad consequences that must ensue from an ill-timed application of the remedy.

I find one modern author who insists upon a something like the proper plan of procedure, but this is only in so far as regards one stage of the disease, others, of perhaps equal repute, could be selected, in so far as respects the insisting on the propriety of this; but as he was, at least, amongst the first who shewed the reasons *why* and *wherefore* he is, on that account now chosen. In his well known work we find the following. “ In the
 “ first place, the time for blood-letting in fever should be
 “ an object of great attention. It should not only be *ear-*
 “ *ly* in respect to the accession of the fever, but the *acmé*
 “ of the paroxysm, or the height of the exacerbation
 “ should be selected as the proper periods, for making
 “ the abstraction. At these times the evacuation will
 “ produce an alleviation of symptoms and often a solu-
 “ tion of the paroxysm or exacerbation; whereas if
 “ taken during the remission of the fever, when the sys-

“tem is, as it were, in a state of collapse, *deliquium*
 “*animi* is often the consequence, followed by a train of
 “nervous symptoms and debility that are charged on
 “the measure, when they ought to be placed to the ac-
 “count of the ill-judged period of its application.”
 Had Dr. Johnson, as well as others, paid proper at-
 tention to these, his own words, as applicable to Cholera,
 we would have found other measures, than those usually
 adopted, pursued as regards the malady in *all* its stages,
 or in those cases in which there is an evident cold
 stage present. In his remarks on Cholera, he observes,
 “restore the equilibrium of the blood and of excitability,
 “and with them, the functions of perspiration and bili-
 “ary secretion.”—This is certainly the indication, but I
 ask how is this to be done?—here the Doctor has left as to
 grope our way in the dark; for this, in the advanced
 stages of Cholera, is not to be accomplished by any pow-
 ers, which he or others have pointed out to us. He says
 properly that “the early restoration of balance in the
 circulation and excitability” is the most judicious
 mode;—certainly, but I am at liberty to ask again,
 by what powers this can be done. Will blood-let-
 ting do it, after a certain time has elapsed?—I appre-
 hend that it will not do so, why then did he, as well
 as others, not distinctly state this, and warn us against
 committing blunders of such immense magnitude. It
 is therefore, only in the more early period of the dis-
 ease that we can expect any advantage from blood-letting,
 for, if our patient has been long under the attack, or in
 instances of a more aggravated nature of even a few
 hours’ duration, when attended with a vomiting and
 purging of rather a superabundance of fluids, we will
 find that, in the vast majority of cases, we can do no
 good by this, as a remedy of general procedure I

strongly deprecate the adoption therefore of blood-letting at *every* period of the attack and under *all* circumstances. Some medical men, especially those who have read but little since leaving College, are apt to imagine, that if blood-letting be useful at *one* period, and this the early one, that they cannot do better than bleed all their patients as early as circumstances will permit, without giving due reflection to the other important points to be taken into consideration. To put such men right the following may be introduced from Dr. Cullen. “ It must appear, that the employing blood-letting in certain fevers, requires much discernment and skill, and is to be governed by the consideration of the following circumstances. 1. The nature of the prevailing epidemic. 2. The nature of the remote cause. 3. The season and climate in which the disease occurs. 4. The degree of phlogistic diathesis present. 5. The period of the disease. 6. The age, vigour and plethoric state of the patient. 7. The patient’s former diseases and habits of blood-letting. 8. The appearance of the blood drawn out. 9. The effects of the blood-letting that may have been already practised.” The more then, we keep these rules before us, and for our guidance, the greater satisfaction of mind, and benefit to our patients, will be the consequence ; as we will find that there is no disease in which damage is more likely to occur, from this as a remedy, than Cholera.

The languid state of the circulation, as the disease progresses, scarcely requires to be adverted to ; this is evinced on the opening of a vein, or the absence of the pulse from the extremities ; for we will find ourselves frequently disappointed in obtaining any quantity of blood even after half an hour’s perseverance, and it may then

come away only drop by drop. It was formerly, and I believe it is even at present imagined, that he is a fortunate person who can get blood to flow a little quicker, even in the warm bath. But I maintain that, under such circumstances, this must always be attended with the most injurious consequences; and, even admitting that some cases of severe depression recover, under this mode of practice, will any medical man say that this occurs in consequence of their being bled, in the hot bath? It is supposed that none will positively declare in the affirmative, and there are some who may be inclined to say that such recoveries are in *spite* of these efforts of alleviation, and why? It may be answered that reaction of the system was, in all probability, just about to take place, at the critical time when such measures were had recourse to, and that such would have gone on to a favourable termination, without their worse than teasing interference. I go a step farther, for which perhaps I may be censured by many, and say, that patients have suffered relapses in consequence of this when resorted to as indiscriminate practice. It is surely time enough to bleed when we have symptoms present, as indicated by the bounding state of the pulse; we should view the case as somewhat analogous to the more severe cases of concussed brain, in which, at first, we have the patient gradually sinking in the scale of vitality, but who is fortunately saved, either through the efforts of the system itself, or our judicious interference, we will then find the pulse rising, and when once sufficiently firm, we perhaps bleed, but only with the view of moderating action, or preventing the consequences that would be likely to arise from a too vigorous state of

the circulation on these weakened parts, to be particularly dreaded, and guarded against in concussed brain. By bleeding, therefore, we moderate the action of the system, and save the brain from inflammation. A good Surgeon would not have recourse to blood-letting in the very *first* stage of concussed brain, but would, to a certainty, pursue some other more appropriate remedies than those of phlebotomising. If the measures here supposed were put in practice, would our patient not sink sooner, and beyond all power of remedial measures?—we would find that no power on earth would be able to raise the circulation, or that of the nervous system, upon which the whole functions of the body so much depend for a due and efficient performance of action. The abstraction of this fluid, therefore, even by the most skilful, clever and perfect phlebotomiser, could not save patients so circumstanced; it would undoubtedly send them to that bourn from which none ever returned. Do not accuse me of giving a forced, or imaginary idea of the evils of blood-letting in such diseases, for be it stated that I have repeatedly witnessed the most injurious consequences resulting from the ill-timed performance of the operation in many diseases by some dabblers in the profession. Such men, however, are a useful sort of beings;—is it not consoling to think that they are able to bear their onus of labour when an epidemic is raging; but then they should be allowed to do no more than administer the medicines, or to look at the gums of the patient which we may in general find them doing every visit, in order to see whether the mouth has become affected; they may also be of importance to examine into the state of other matters, as connected with his comforts. Such a class of men are useful and well able to bear the drudgery of the profession, as their minds

are in general totally insensible to the finer feelings, which will always be characteristic of the truly sensible physician.

“ In my hospital practise” says Dr. Kennedy, “ I have never made the pulse at the wrist the criterion for bleeding ; but the question for its necessity has depended on whether the vomiting and purging have been of long continuance and accompanied with copious evacuations, for where such is the case, a real and positive exhaustion of vital powers is induced, totally independent of apparent debility of the collapse ; respecting which there is no necessity of stopping to argue that it is not actual weakness, but a symptomatic syneope of the animal powers. If the discharges, by the mass of the matter evacuated, have induced positive debility, bleeding is to add exhaustion to exhaustion ; and our attention is required to the visceral irritation, and to support the sinking powers of the constitution. But if native strength be inherent and not as yet broken down ; if the discharges have been of long continuance, nor voided in preternatural quantities, I would always have recourse to bleeding. First it relieves the spasms, and saves the patient the anguish of pain and the fatigue and languor which follow it ; and secondly, by abstracting a portion of the circulating fluid, it is withdrawn mechanically from the secreting vessels of the viscera, and the congestion there is instantly relieved ; by this the quantity of the future discharge is diminished, and the venous evacuation is less exhausting than the unnatural visceral secretion which it interrupts. These alone are satisfactory reasons independent of the reduction of nervous irritability, the exciting cause, which forms in my view of the case, the first leading reason for

“ bleeding, but which will not of course be taken into
 “ consideration by those who do not consider the disease
 “ to be dependent on nervous disorder. It has there-
 “ fore been my invariable rule to practice bleeding un-
 “ der such circumstances: I always feel it a subject of
 “ great regret when I cannot bleed; it is in my mind
 “ next to signing the patient’s death warrant, when I
 “ decide that the critical moment is past and he no
 “ longer capable of undergoing it.” The above is by
 for the best article that I have any where met with, and
 certainly exhibits our author as a talented, and pretty
 shrewd observer of the laws of nature, there are a few
 strictures to be made on it—not, however, with the love
 of finding fault, but with that of scrutinizing for the
 truth.

It may be stated that the above applies more forcibly to the milder cases, and that it is not admissible in any of the more inveterate forms of the malady, if we have lost the favourable moment of the formation of the attack—In proof that blood-letting should not be heedlessly had recourse to, particularly amongst the great majority of the Natives, I have only to instance those cases in which another plan, as pursued by Dr. Kennedy, was successful, and in which not one of them was bled, and yet all recovered. This, therefore, may serve to point out the true consideration of our patient’s constitution; it may also be observed that the more naturalized others are to the habits of the Natives and to the climate, the less frequently will we require to take lancet in hand; if we do so, as a general mode of practice, it is imagined that our success will be thereby greatly diminished,—we will find that in proportion to our non-interference in this respect so will our recoveries be. If we bleed for the purpose of

relieving spasms and pains, or to reduce the irritability of the stomach at the very onset of these, we may do much harm, for they may not have commenced until the disease has been duration for some hours, or they may have arisen from an irregular state of the bowels, which has been in existence for some days. There are two points to be attended to in the proceedings; we may certainly expect from blood-letting that it will act like a sedative, but then this will probably only be for the time, and if it does so completely we may find that the powers of the system are too much weakened. These spasmodic affections have a great chance of returning, and this too at a very short interval, when they will be in operation according to the remaining vitality. What then have we gained by the practice?—some may imagine that if they can get the blood to flow they will allow more of it to escape, by these measures we may certainly reduce the irritability, but along with it, and, in proportion to the quantum abstracted, so is the patient's strength diminished, and thus a more sure and firm foundation is laid for the malady to commit depredations on the vital and animal powers. Even admitting that the quantum abstracted will, to the same extent, lessen the stimulus of bulk to the intestines, this can only be for the time, for if the circulation be not put into activity, it will only again collect here, from the circumstance of the general tendency to its being withdrawn from the surface, hence it will again, and in a short time, only-renew the former state, and being now under the circumstances of doing harm, for it will certainly operate with more force, in proportion to the increased debility, it will make the attack more liable to assume the white and watery stools so ominous of a fatal termina-

tion. Besides, as elsewhere noticed, the blood abstracted comes from that in actual circulation, which also, on this account, finds a more easy access to the more internal parts, and thus double the quantity intended, is taken away from the circulating medium ; besides, a torpidity is added to the whole powers of the body which we cannot well remedy. Bleeding, therefore, although it allays the vomiting and purging, will only render the bowels torpid, they are even now surely, in this state, sufficiently large to contain the whole of the more fluid particles of the vital fluid, without being stimulated into activity by it ; so that we see the great damage which is likely to arise from undue interference: do we not find, under such a state, that the bowels are pretty well loaded, with a mass of fluids in addition to those which have been given to drink ?—we hence conclude that a portion of such must have been drained from the blood.

Bleeding is not useless in all cases, for we know that patients have recovered in which this has been timeously had recourse to. An important question to be considered, is whether such patients would have recovered, even although the remedy had not been put in practice ; there are some no doubt who will go so far as to say that such cases recovered in defiance of the lancet, and that such actually run a less chance of recovery than others who have not *suffered* from the operation. The true answer to the above depends on some points of importance—such as the period of application—the plethoric state of the patient,—the duration and severity of the disease, &c. Blood-letting, like an emetic in cases of disease, particularly fevers, cannot put a stop to their progress, when the disposition to them is once *fixed* in the body ; it may relieve particular symptoms, but cannot *up-root* the disease, which must

and will run its course, in defiance of the remedy, and we will find if it is not employed at the very *formation* of the attack, that, instead of doing good, it may be attended with bad consequences, even in those cases in which we observe nothing like the same extent of lesion inflicted on the nervous system, as is to be met with in cholera. But, as at first, these remedies are put in requisition just as the disposition of the disease has fairly shewn itself, they may do good, by turning the attack into another channel, and thus checking it at the onset. So, in this disease, they may be of benefit when very early had recourse to, but this much more seldom than in other cases of disease, from the causes stated. Besides checking the vomiting and purging, on its first appearance, is not of that very great importance that many would lead us to believe; we find that many practitioners have given emetics, or, as Celsus recommends, draughts of warm fluids, to encourage the former, and not without effecting many cures; the merits of this practice, however, do not fall to be considered here. The venesection may therefore at *once* check this tendency to venous congestion, and allow the circulation to proceed under the ordinary circumstances of a mild attack, which is unattended by those ominous discharges so characteristic of a fatal case. There is one point to which our attention should constantly be directed; as we cannot tell the extent to which the attack may proceed, whether it will be mild, or severe, we ought to be cautious as to the quantum abstracted, and this the more particularly so, when we observe the cases around us proceeding quickly through their various stages, and not unfrequently to a fatal termination, even under the mildest forms; in these circumstances.

had blood-letting been employed, as early as we could wish, we would often find that our patients would sink more quickly, especially when the symptoms arrive speedily at their maturity, in which they are greatly aided by our unnecessary interference. But in those cases in which we meet with cholera of a milder character all around us, (since the variety to be met with is great, from the simplest derangement of the bowels to the more distinctly marked forms, such depending on what has been already stated,) then we may use the lancet with more freedom, but the nearer the cases approach to the real nature of the disease, we must do so with an anxious and cautious eye. The difference in this case I conceive is somewhat equal in magnitude to the swallowing a large and small dose of poison, and much under the same circumstances, as where an inflammation of stomach arises from this cause; by bleeding in those cases in which little has been taken, we may possibly prevent the inflammation from proceeding to extremes; but, in the other instance, little good would be derived from the remedy,—we would only find our patient sinking the faster. The nature of the disease therefore, must be most carefully taken into consideration, and we may at times, derive much advantage from witnessing the effects of blood-letting as practised by others at this period, such of course will serve for our guidance, according as we see that they recover equally with those who have not been so treated or the reverse. Another point in the epidemic is that at times the attack at the very first so stuns the powers of life as to lay prostrate almost all it assails, whereas, as it progresses, it assumes a milder form. I do not give this as a general rule but it is one worth attending to, and the reason why it should be so have been already stated.

Bleeding then, as a *general* practice, I venture to say has not been of great utility ; it is not stated that it may not have *occasionally* been of service, such would be a most outrageous assertion, but I affirm that the chances are that patients so treated might have recovered in *spite* of the remedy, as there are so many chances against its successful application. "The Surgeon who makes his duty conscience-work will find this a painful point to decide on ; it is the life and death-question ; and in the emphatic words of Celsus, *neque tamen ulli morba minori momento succuritur*, (it is imagined that he meant *difficilius succuritur*.") From what has already been adduced we see that the question of blood-letting is extremely pertinent, and if there is, as every one I think will grant me, a greater impression made on the powers of the nervous system in this disease than in the cold stage of some Indian intermittents, I verily believe that such practice during the continuance of this in cholera must be injurious in the extreme. If we treated the disease under the idea of non-interference with the lancet, in the cold stage of this very cold malady it is thought that we would generally be correct. How would a rule of this form do?—*bleed in no case in which the skin is colder than natural, even although we can obtain as much blood as desirable*. I have no hesitation in declaring, that these deductions are well founded, particularly if derived from the nature of the disease when fully formed, and that we would find no benefit from its adoption, after the attack has continued even a few hours, for we have lost the favourable moment, just in the same manner as applies to amputations on the field, where if we dare use the knife before action has come on, or before the man has greatly recovered from the shock of diminution under which he at first la-

boured, we will find that our patients do no good. No sensible Surgeon ever operates in the state of collapse; neither ought this to be done when the system is too active, we must rather wait until it is reduced: the interval between low and superabundant action is to be chosen. As in cholera, we must have some action adequate to keep the powers in being, can we use the lancet with any chance of success in the collapse? If there is any period at which such can be used is this not at the time when the skin is *above* temperature either before or after the period stated?—it must then be used only with the view of *moderating an excess of action in the circulation itself*. Even admitting that we do get the blood to flow in the collapse, or cold stage do we not observe almost every one of them so treated terminate fatally?—the few that may recover, as I have already stated, are such as escape from the injurious effects of the treatment, rather than in consequence of any benefit derived from it. Does not the very circumstance that the system does not freely part with its blood, sufficiently admonish us as to the inutility of the practice; for in many or at least some of the diseases of this class which are to be benefitted by blood-letting, we will find the body not so obnoxious to its abstraction, but that it flows freely, perhaps not at first, but in a much less space of time than it does in cholera. But all the injurious consequences of blood-letting have not yet been mentioned, for, by its adoption, we may even bring on the watery vomiting and purging, by breaking the balance existing between the sanguiferous and nervous systems. “It not unfrequently happens” says Dr. Kennedy, “that the instant the blood has begun to flow, the natural course of watery vomiting and purging commences.” This, as I have shewn, is not a

salutary or much to be desired result, but he thought this vomiting and purging to be the natural and sanitary efforts of nature to relieve herself! This watery *materiel* is one of the most destructive symptoms that can possibly occur in the complaint, for, as already observed, when present, it but too frequently excites the spasmodic affections, by which the powers of the system are inordinately expended; as could easily be shewn, not only from his own statement, but from that of every one who knows any thing concerning the complaint.

Let us pursue the question as to the propriety of blood-letting, and it is to be hoped that nothing worthy of notice will prove too tedious on such an all-important subject, more particularly when we know that none else have given it the severe scrutiny which it certainly demands. Is blood-letting therefore serviceable in *all* cases of *hemorrhagy*? Dr. Cullen in treating of the cure of such, states that “a *small* means which has been frequently employed is *that* of blood-letting. The propriety of this practice may be doubtful, as the quantity of the blood poured out by the hemorrhagy may be supposed to answer the purpose of an evacuation in any other way: and I am ready to allow, that the practice has been often superfluous, and sometimes hurtful, by making a greater evacuation than was necessary or safe.” Comparing cholera to this state of the body if my premises are well founded, it follows that blood-letting should *never* be employed in the more severe forms of the disease, or in any case in which the symptoms are well marked from the first, since such abstraction must only add to the general oppressing cause, and it is surely enough that we have only one hemorrhagy present under the particular forms of the complaints noticed, for the operation, under such

circumstances, would add one evil to another. It has been mentioned that blood-letting may be employed, with some chance of doing good, under those cases of the disease, in which the patient is robust and plethoric; provided the ominous discharges have not occurred; we must be guided in our practice by attending circumstances, always bearing in mind that, in certain seasons, even the mildest form of the disease has a great tendency to assume the more inveterate characters, and that they are exceedingly apt to be urged on by the very use of the lancet, and in proportion to the abstraction of the vital fluid. The question, at this stage of the enquiry, resolves itself into that of the treatment of a passive hemorrhagy, in which we cannot abstract blood, but must use other measures to quell the inordinate disturbance—for the system in cholera having lost its tone, not only of the muscular fibres properly so called, but also of the blood vessels, which, as we have seen, venesection, particularly when practised out of season, only tends to encourage and thereby causes that “*bug-bear*” *direct debility*. Is it not so? It is imagined that it necessarily follows from this, that, by diminishing the tone or tension of the system in some of the epidemic diseases, and more particularly in that under consideration, we must do irreparable mischief to the whole bodily powers, since we must admit that the blood keeps the whole in play through its operations on the nervous system.

We might as well expect, by removing fuel from under the boiler in a Steam engine, to have the quantity of steam generated necessary to keep the engine in active operation, as to promote the healthy action of the body, by abstracting blood under the circumstances here supposed. The due and efficient performance of the engine

depends, in the first instance, on the proper quantity of fuel being added ; but if this be in excess, then we have too high a degree of the heat, and a consequent increase of the steam, with an irregular action of the whole, or a bursting of the boiler. Something of the same nature I consider as occurring in some diseases ; and I may, for the sake of comparison, view the blood in cholera as that fuel which gives energy to the whole, by being freely distributed to every part of the body, and which stimulates the nervous system not only at its fount, but in every part, according to the degree of purity and the quantity transmitted. In fine then, it serves to keep the *steam up*, which a glass of grog would do in ordinary cases. Bleeding, in cholera, therefore, we must allow to have a sedative operation, but its effect is to reduce the action of the whole system to a very low state, as is shewn by the cessation of the spasms, the vomiting and purging, when this occurs. That we may be sensible of its powerful operation in this way, we have only to consider that under ordinary circumstances in other diseases, it is not easily accomplished, even by the most powerful anti-spasmodics which we possess. I have said that as the animal powers in cholera are too much oppressed already, some remedy, less injurious than the powerful one of phlebotomy, should be had recourse to for effecting such indications. The animal and vital powers are so perverse in this disease, that they are ready to catch at the grand chance of any thing whose tendency is to free them of the onus of a watchful guard over the body, and thus it is quickly depressed. It may in some manner be compared to a delinquent who has grievously erred, and who, when brought before his superior, is glad to plead any, even the most trivial circumstance in extenuation of his guilt,

but which in the mean time he has no solid grounds for urging,—thus cholera is glad to lay hold of any thing in order to work destruction. The disease is not of so inflammatory a nature as to demand the imperative use of the lancet, nor is there even that *high* action which is requisite to be subdued in this manner; when so, in the name of all the powers, bleed to *moderation* but not one iota beyond it. Blood-letting, in the more severe forms of the disease, has rarely or ever done good, but as we have seen, must be attended with very decided injury, as is soon evinced by a rapid sinking of the whole vital and bodily powers. Dissection, it has been stated, has not as yet shewn the inflammatory nature of the disease, consequently we must always bear in mind that if the system once get below par in cholera, it is with the utmost difficulty we can put it right again, and that the blood is necessary for maintaining it at that pitch which is actually requisite for existence. This disease we know frequently runs a rapid course, there is no use then for hurrying it on in its career, by the abstraction of blood, as a very small matter may serve for turning the scale on the side of life or death; moreover, what business have we to interfere with it in this way, if such cannot be accomplished by the other means of procedure. In place of abstracting blood, our object should be to employ some power of adequate force to keep this going on, and if we want to quell inordinate actions we will find that it is best done by other means than those, the more immediate subject of enquiry. All the activity we can *moderately* give the system under such circumstances we may find not to be too much, nor will we find any serious consequences resulting from it. If blood-letting could be resorted to with advantage, it is odd that it should not long ago have been established as a general mode of procedure.

But it has not been universally useful, even in cases precisely similar, as is abundantly evident, ought we not therefore to abandon it in all cases which do not seem likely to be benefitted by it, if judged proper at the commencement? This is the only period that I allow it to be of decided use, or in the second instance where re-action has sufficiently established itself, when we even then must be very careful as to employing it, and when so we bleed to subdue an inflammatory state of the bowels, or to prevent inordinate action in some other important quarter. "I am convinced" says Mr. Craw "that after bleeding and the bath, a *powerful* purgative and a *strong* cathartic enema would have a much better effect than narcotics." "He now laments extremely the scare-crow of imaginary debility should have deterred him from employing the only remedy which could have promised a successful result, as the appearances on dissection have but too well proved the necessity of such treatment." I am exceedingly glad that any one should have stated that blood-letting was of so much benefit at *one* time, since it gives me an opportunity of observing that the disease, in our day, must have increased in severity, as it was once more mild: from the latter conclusion we may certainly expect that there may be a time when it shall again assume more of its benignant aspect. What sort of cases were they that were so treated?—were they the congestive typhus forms of the disease which are sometimes to be met with? If, however, such was the actual fact so far as related to every corner in which the distemper shewed itself, we would surely have found every practitioner not only having recourse to his lancet, a point so easily put to the test, but we should have had the remedy lauded by all. This is not, I am sorry to say, positively the fact, for we will

find under all circumstances of true cholera, that what has been already advanced as to venesection, will hold good in any quarter of the world, especially where the body is so liable to be overpowered by that all-powerful cause heat which relaxes and expands every thing even the blood itself.—The more inveterate forms of the disease we know well, when the auspicious period is lost, cannot be saved by such practice, for, as we have seen, our patients must inevitably sink, and this quickly in proportion to the abstraction of the vital fluid. The phlebotomising therefore is no *imaginary scare-crow*, this we find to be actually the case in the present day, however much it might have been practised in the past, and as discerning men we cannot have recourse to it as a general principle for our treatment. Unless therefore we only select cases, under the circumstances mentioned, we will find that this is not an imaginary but a *real* scare-crow, and that, from this cause alone, we are deterred from putting it so powerfully into effect.

The appearances, as met with on dissection, which I have stated to be delusive in the extreme, have positively misled many as to the true nature of the disease, as regards its inflammatory character; from this the consequent adoption of a mal-practice. I cannot imagine any disease in which so much havock has been committed from the general adoption of this, as a theory, than in the present. Bleeding,—nothing but bleeding, with calomel and opium, was in the mind of every tyro, on his first arrival in India, and this, as a matter of course, also, was the opinion entertained by some clever men. If they used the former remedy, I would allow them a cart load of each of the articles, and, with such an allowance, they would not be enabled to save their patients. Before abstracting blood, in any cholera case, we

ought to consider well the reasons *pro* and *con*,—as well the duration of the attack,—the nature of the constitution, and all the other items which it is unnecessary to mention here. Even when we can get blood to flow, and only detract to the extent of a pound or so, this may only remove the same from the more superficial veins, which we may observe sometimes full, but it will do no more; for we cannot, especially in the more severe forms, have it withdrawn from the brain, or the other internal parts; besides, if such could be accomplished, will we not only allow room for the accumulation of more in them, since the heart—the main-spring of action—is incapable of propelling it to the full extent demanded by the system. How many, may say, in support of their views, as regards the propriety of venesection in every case, take off the stimulus of bulk, or that cause oppressing the system, which consists in the venous congestion, and we will certainly have the onus removed, and thus allow the blood to move with more freedom. This, however, in cholera, is not a natural consequence, since we are fully aware that the nervous system is in a high degree *deadened*; unless therefore, we get this into a state of operation, our efforts must be nugatory in the extreme. Venesection, although a feasible method for effecting this, is not the remedy that will be found to answer in such cases, more especially when, from the duration of the attack, there has been a commencement of the ominous discharges to which we have so frequently referred. Mr. Chalmer, in 1820, in addressing the Madras Medical Board justly observes “one thing, however, I fear is certain, viz. that we are, as yet, as little acquainted with its origin, as we are with its cure: for example, I read from Bombay, that a number of cases of the epidemic have lately appeared

“ on the Island, but that its mode of treatment is now
 “ so well understood, that its re-appearance causes no
 “ alarm ! at the same time I hear from the camp of a
 “ corps on its march : We lost about ten people a day ;
 “ no one returns alive from the hospital tent, and our
 “ Doctor says there is no cure for it ! one Medical man
 “ boldly estimates his cures by thousands ! while his no
 “ less zealous neighbour is heard to say, though he has
 “ followed the same plan of treatment that he has fail-
 “ ed throughout” !! On the close investigation of the
 subject I must in truth say that no plan of proceeding
 hitherto adopted, as a *general* mode of practice, has
 been of any great avail. Let me ask would any one
 attempt to treat dysentery on such principles ?—if he did,
 he would find himself miserably deceived. How then
 can we expect it to be otherwise in Cholera, in which we
 have it assuming as many features, as we meet with
 a diversity of human forms. The whole of the medi-
 cal world can now testify as to the inutility of apply-
 ing one mode of procedure to all cases, and the
 more I see of the disease, the more I am convinced
 as to the inutility of such a fixed rule, which, in many
 instances, seems to have been as inflexible as the
 laws of the Medcs and Persians. Cholera, in short,
 must be combated according to the identical symp-
 toms present in the particular habit of body attacked.
 It is not wished to make ourselves routinists, but I do
 state that such will be found to be the case. Any
 one therefore who attempts to lay down laws, for
 the general treatment of this complaint, so varied
 and eccentric in its modes of attack, might with
 equal propriety attempt to frame laws of the same
 nature for the general guidance of the imbecile,—
 the egotist,—the docti and indocti,—the discriminating

and non-discriminating,—the rich and the poor,—the beggar and the prince. To attempt therefore such a task would be perfectly hopeless; none can do it, none have hitherto done it. There is therefore nothing that will answer but a proper application of principles to practice, under all, or any class of circumstances. This epidemic appears to have been treated by many, on as universal principles as its ravages have been extensively spread over many of the quarters of the globe. The compilers of the Bombay report bear high testimony to Dr. J. Johnson and not without some cause, for as they state he “has also the merit of having been the “first who has generally pointed out the best method “of cure from a *few* cases he met with on the eastern “coast of Ceylon, where the disease seems to be more “prevalent than in any other part of India.” I by no means wish, were it even possible, to take any of the laurels from the brow of such a personage, I therefore agree with the correctness of the latter clause in toto, but, certainly not to the first part as it has been shewn that very injurious consequences would ensue from the universal adoption of this as a remedy in those cases in which we bleed, even at the very moment of the formation of the attack. The Doctor may attempt to defend this as he pleases, but it is imagined that it would be of but little avail, since all men know that now a days, at least, the practice is far from being of such general utility as he would induce us to believe.

Dividing the disease, as has been done, into stages or varieties, we may possibly be enabled to reconcile the opinions of medical men as to the proper application of this remedy, in this or that particular case, under this or that appearance of the disorder. By referring to our first variety we will find that many of them may be compared

to dysenteric attacks of a rather aggravated nature, accompanied with febrile symptoms from the commencement ; now, in all such we may see the reason why we may, in general, be so successful with venesection, accompanied with large doses of calomel, as a *sedative*, and perhaps occasional opiates. The disease, under such circumstances, like the congestive Typhus of India, or dysentery with fever, gives us not only time but also strength of the system to handle it, and we have also the stomach, as well as the several parts of the alimentary canal, capable of taking up medicines, and forwarding them to the different parts of the body, so that we can bring it under their influence, and therefore do almost any thing either in the way of depressing or exciting it,—having native strength to support our efforts, and it may serve us for a rule in all such cases. But, in the more severe forms of the epidemic, we have another state of the body, all but reversed as compared with this : here the system is not obedient to the former laws, it is weak and incapable of acting, for a state of affairs other than the mere lowering of its actions, is induced ;—it now either refuses or loathes our remedies. What can be done under such a state of things ? It is a melancholy fact that do what we can for its relief, in many instances, we will be frustrated, —it refuses or sickens at our remedies : blood-letting under such circumstances must only sink the native strength without possessing the power of adding any thereto. We, like mechanics, must stand by for the time being, or until the broken spring of the machinery shall have been repaired, ere we can begin any thing like successful operations :—these must wait until the fire has raised the steam sufficiently high, or until any derangement has been rectified, ere they can get their engine to

work; so also must we in some measure view the operations of the human body, as in a great measure depending on the nervous system as its main spring of action; until this be set in motion, or repaired when injured, all our endeavours will be frustrated. The fire, or the power communicated from our stimulants is the means though which this may be accomplished, and by which we may also possibly get the circulation again in progress, when we will have an energy communicated to the whole of the animal machinery; commensurate with the extent of this action, when under these circumstances, we may either moderate or raise it to the point required, and be enabled to guide it according to our pleasure.

It will be seen, from this lengthened detail as to the general utility of blood-letting, that it has not always been the most proper plan of procedure, even when employed at the moment of the formation of the attack; from this we may conclude that the remedy has not been properly advised. This opinion is founded on a seeming, but unintentional error committed by its most strenuous supporters, who have not stated with sufficient distinctness whether the then prevailing disease runs through its various stages in rapid succession—producing death on an average of from six to eight hours in many cases or in few,—whether the constitution of the atmosphere, to use the language of Sydenham, seemed to predispose to this rapid decline, or, in other words, whether the epidemic was very malignant or the reverse. Venesection I say again has been too generally and indiscriminately practised on every patient, no matter the appearance, or how long he has been labouring under the attack &c. The advice is bleed, if the pulse be at the wrist, and if we can get blood to flow; such, however, as I have shewn,

if followed, must be attended by consequences the most injurious and destructive to the well being of our patients; and, in very many cases, I can have no scruple in saying that this measure, alone has been one great cause of our failure. As well might we expect a mill to continue in full operation, after depriving it of a half of its necessary supply of water as the body, in many cases, by depriving it of its proper supply of blood.—We must enquire into the circumstances of the case; has the purging been of long duration, or the quantity considerable, what is the state of the patient as regards constitution, age, the manner of diet previous to his seizure, has the *drain*, which I have formerly alluded to, been established as shewn by the whiteish watery stools, &c:—if so venesection must be sparingly and discriminatingly employed,—if in fact it be at all admissible. These questions having been fully considered, let us now look at the general history of the epidemic; and every one must admit that it is one which speedily reduces the powers of the body. Some may attempt to throw blame on me for insisting so minutely, and at such length on the propriety of blood-letting, by saying that such has already been done by eminent and distinguished men; it may be asked where are such rules to be found; if they ever issued from the press, they were surely still born;—the very pressure, to which they had been subjected in the process, seems to have suffocated them in the act of being produced. Have any such appeared? We, for example, receive a patient, who has suffered for a few hours, has passed four or five stools or more, (about a pint each time,) the pulse is perceptible at the wrist, and he had been a considerable time in a hot climate, but his constitution is none of the best, the countenance anxious and strongly Hippocratic. the livid circles

around the lips, the eyes sunken, a coldness of the surface, &c.—the question is, should such a patient be bled, although he would be by the majority, under the old ideas of the disease? My answer is certainly not, what advantages could we gain from phlebotomy in this instance, would we not find that our patient must sink in proportion to the blood abstracted, and it has been shewn that, by the operation, at least double the quantity intended is apt to be withdrawn from the circulating medium. If we have got much blood to flow the chances are that he will not recover at all, for the shock of diminution to the system will be so great that we may put it beyond the rallying point, in our very endeavour to turn the tide of affairs.

Let us now suppose, that a robust, and previously healthy patient, not long under the influence of a tropical climate, or of the disease, makes his appearance, and that the epidemic has not shown much malignancy of symptoms, either in his system or among the other patients, that he has had two or three *scanty* loose stools, and that his countenance is not by any means of the ominous caste formerly mentioned, pulse good, &c. If we bleed such a man in this stage, the chances are strongly in our favour. By doing so we change the action in the system, and the tendency to torpor and venous congestion, and remove a *load* from the circulating medium, which, had it remained, would only have tended to the general disturbance and irritation which are so apt to occur at this critical juncture without the application of remedial measures. In the first instance, the patient has passed *many* watery stools, and has other strongly marked symptoms which indicate that the drain occasioned through the medium of the smaller branches is now established, and such being the case we cannot with pro-

priety bleed. In the latter instance none of these things are present, and as yet the drain has not been established, therefore blood-letting in such a case must take off that load, from the circulation, which is, in a great measure still in active operation, and which by its presence must tend to throw the parts more immediately concerned into a disordered state. Here also we have a strength of the nervous power which does not exist in the other, and which consequently from its not being in a very torpid state, will act with greater promptitude. Let us take the second instance under somewhat different circumstances, even although but a short time in a tropical climate. The disease has existed for two or three hours,—the pulse is what may be called pretty good, but the purging is of that ominous sort,—the stage of collapse is about to take place,—the dejections amount to nearly a pint a time,—the patient is becoming restless with a strong tendency to cramps of the toes and legs, (if such are not now actually in being,) and the general character of the epidemic has or has not a strong tendency speedily to assume the malignant form. Will bleeding under such a state of things be proper or available? I should say no, and that if it be used it will have a strong tendency to depress the animal and vital powers, as will be shewn by its overcoming the force of the spasmodic actions. From the above, we may be enabled to act with more discrimination; but it is deemed unnecessary to enter more fully into this part of the subject.

Lengthy as this article has already become, it is deemed of importance to elucidate the subject a little further, so that if there is a doubt in any man's mind, the following may in some measure serve to dispell it. Let us now compare it with some other lesions of the body

which also powerfully depress the animal and vital powers. Injuries of the lungs, in consequence of a rupture of some of their substance and blood-vessels, and causing an immense expenditure of vital fluid, require a mode of treatment which might even awe the boldest, at least make them cautious, ere they adopt it did we not know the general utility of blood-letting in these cases. We bleed in many of these cases in order to *lessen* the circulating mass, with the view of having a coagulum formed upon the mouths of the bleeding vessels, and this, in conjunction with the other remedies generally used, may possibly save life; this then is a most feasible plan. Take the system, however, under other circumstances, in which we have an extensive hemorrhagy, such as occurs in flooding, which has continued for some time, when the *tone* of the body is greatly reduced, and an exhaustion of the animal and vital powers has succeeded, so that our patient is at a very low state of existence. What is to be done, blood-letting under such circumstances, would only hasten the fatal catastrophe in such instances, stimulants must be administered, and astringents applied so as to brace the powers of the system;---the flooding continues only from the want of a sufficient power to stop it, from this it follows that tone must be added, and the innate strength must not be further reduced by venesection. In cholera, as compared with the first instance, the point is widely different; for here we have rapid exhaustion produced or apt to occur, not only from the innumerable mouths of the vessels, which open upon the internal surface of the alimentary canal, but also from the condition of the blood which is but little adapted to form coagulums any where in the body; in addition, the system is suffering generally from the severe lesion of its nervous func-

tion, every thing now being as bad as possible. By bleeding, in cholera, under this state of things, we would only as in the second instance, produce a greater relaxation of the body, which is already suffering too much from this cause. The difference between cholera and the injured lungs, seems to be, that the one is a *constitutional*—the other a *local* disease. The cholera therefore must be combatted, under the circumstances supposed, by a remedy far different from venesection. The advocates of an indiscriminate use of the lancet, may say, the above examples are not quite to their mind, since a disease of a constitutional kind and much more to the point can be easily brought forward. I shall take Diabetes Mellitus when fully formed. In this disease I may add that the finer or watery parts of the blood are withdrawn from the system, by an inordinate action of the smaller blood vessels of the Kidneys, acting something in the same way as syphons either with an increased or decreased action, or from too great, or too little nervous power being supplied more immediately by the nerves of these parts which certainly when in health serve to keep the whole in proper play. But even granting my view of diabetes correct, it is a channel widely different from that, which so extensively occurs in cholera. We all know that the renal arteries are large, and have a direct communication with the mainpipe of the blood, which may account for the enormous quantities of fluid evacuated in such short periods. The *subcaerulei* colour of the urine, which we not unfrequently find in such cases, may be only the serum of the blood mixed with the urine, in consequence of which it has now undergone some change. As to blood-letting having been employed successfully in the treatment of diabetes, any one can easily bring forward Dr. Watt, of

Glasgow, as a strong, and perhaps the most strenuous advocate in support of the practice, that is any where to be found. He bled with an unsparing hand, the most squalid and emaciated patients, even in the last stages of the complaint, and ultimately succeeded in restoring such patients to apparently sound health. But to bring the point to bear on Cholera, here we have much more to contend against, we have a disease deeply implanted in the constitution, and attended by a greater combination of circumstances than takes place in diabetes. *The smaller vessels, which open on the internal surface of the intestines, when once set agoing, will continue to act as syphons until the whole of the finer particles of the blood withdrawn from the system! here is an awful dilemma which is increased by these vessels having lost their tone, from the influence of the nervous energy being entirely abstracted.* Besides, in diabetes, the blood does not undergo that change which renders it so peculiarly liable to be withdrawn in this manner, as in cases of Cholera. I do really think that it is in this way also that the blood is withdrawn from the arteries, after life has become extinct, since we generally, if not invariably find them empty, on inspection; we know also that they are full during life, why and by what means then are they emptied when death takes place? The smaller vessels, therefore, taking on the action of syphons will be exerted after death, since neither they nor the blood have any thing to preserve their tone; we know also that syphons, whether of animate or inanimate substances, continue their operations as long as there is a particle of fluid to be drawn off. The reason that the blood is taken from the arteries into the veins, and not *vice versa*, may appear when we consider that the latter are much more easily dilated; in addition to this, it is the ge-

neral action that has been going on during life, and this, when once established, will, as a matter of course, continue in operation as long as a particle of fluid is presented to them, and this may in some measure answer one of the questions in Dr. Kerr's strictures on the Harveian doctrine of the blood. From the above remarks the following general deductions may be drawn. It has been attempted to be proved that blood-letting is not to be indiscriminately had recourse to, and I have followed up my general reasoning on the subject by introducing particular instances. In bringing forward diabetes, I have shewn the wide diversity of the two diseases---The one, although of the nature of a general disorder, may, with more propriety, be called a local one, in contrast with Cholera, which, in its general aspect, is one of the most powerful constitutional diseases with which we are acquainted, acting, as it does more speedily on the system than any other disease with the solitary exception of plague, it must be first on the list of malignant diseases for its quickness of despatch. An epidemic, therefore, of such a nature requires some consideration ere we can venture to take away from the body that which we cannot so speedily supply, and upon which, as has been fully shewn, it so much depends for a continuance of its operations. We ought to inculcate, on the minds of all liable to be attacked, about the period that we may expect an epidemic to appear, a very early attendance, since we see the great advantages thereby given us before the awful drain is established; I would rather that twenty men should be under treatment with slight bowel complaints about this period, or a head-ache, with a little oppression about the thorax, than that one should suffer from a protracted time of application. The rulers also, in my humble opinion, ought to do away with

the payment or deductions from the soldiery, at this particular period, or during the prevalence of Cholera, on their first admission into hospital, as the men frequently, from this circumstance alone, delay many hours in making application for medical treatment.

Before leaving the question altogether, it may be proper to enquire into another point which has divided medical men in opinion for a very considerable time past. Blood-letting and calomel:—much has been said as to venesection and mercury used at the same time, in the treatment of certain diseases. It has been stated, and pretty universally admitted, that bleeding is a sedative, and mercury a stimulant; in other words, that in the treatment of certain diseases we were blowing hot and cold with the same breath. We know that in conjunction, both plans of procedure are most essential, not only to the relief of certain states of disease, but that they are the main remedies to be depended on for the successful issue of the case. Venesection of course is employed with the idea of reducing excess of action, or raising this to par, when deficient, in those cases in which the nervous powers are not deadened but only oppressed; this it does by relieving venous congestion or by producing some other effect on the body. Having accomplished this, we give mercury but not as a stimulant, for this is not its first action on the system or parts; it will act by opening the various sluices of the body, or the secretions, and, in proportion as these are put in play, we have the mercury carried out of the system ere it shews its stimulant operation; this operation is *never* shewn unless in those cases in which the medicine is given in such quantities as to affect according to the doses, and the duration of the time it has been administered. The practice then, so far from being incon-

sistent, is actually requisite, and may be most properly combined in all high states of excitement, particularly in the fevers and dysenteries of hot climates, with this saving clause that the disease is attended with a high state of excitement of the bodily powers. which we will find indicated by the state of the pulse, the flushed face, and attended by a steady and permanent heat of the skin. In such cases we can depend on no remedy so much as a sufficient depletion at first, and then an immediate recourse to calomel, with the idea of inducing an altered condition of the secretions, to which there is generally a great tendency, and which will become decidedly disturbed, if these proper measures are not had recourse to at the onset. But in those which speedily reduce the powers of life, it becomes, as we have seen, a question of no mean import in how far we can safely have recourse to blood-letting: I have frequently stated that such practice is dangerous, and that we may not unfrequently expect death as the consequence; while there are other instances again in which it will be attended with much advantage. Now in these difficulties we will find that the calomel and opium plan promises a much better chance of cure; but calomel requires some time for its *full* effects being produced and we find that it is the best remedy that we can use when time is to gain the day. Calomel may, therefore, in the majority of such instances, be safely thrown into the system *from the very first, and ought never to be neglected, even when we administer other remedies, with an intention of overcoming this or that particular set of symptoms.* The mercury if taken into the system when so given, will to the same extent shew its various good properties, and so we will not unfrequently save patients. Whereas had we delayed and only had recourse to the other measures of over-

coming symptoms, and after the lapse of many hours, administered calomel, how often, alas! would we be frustrated, and find that we were now too late; for it may so happen, and indeed it is very likely to be the case, that the system is in such a weakened condition that it cannot take up any medicine which requires some time to shew its constitutional powers. Be it remembered that it is upon these alone, in a very great degree, that we can depend for the safety of our patients. Let none talk therefore about blood-letting and mercury being inappropriate methods of treatment because diametrically opposed to each other, for it is plainly shewn that they are both absolutely requisite in diseases of hot climates which are attended with high excitement. I do not, however, allude to stimulents in combination with phlebotomy. It may be observed that calomel, or the blue pill never *raises the pulse*, until it begins to shew its *constitutional* powers, and this will be in the fewest instances when there has been a considerable quantity given, so as materially, to affect the system:—as to its local operation we have nothing to do with it at present. *Calomel therefore is not by any means a constitutional stimulant at first*, in any dose, and the less so in large ones, and by the time that it can operate in this manner, the effects of the bleeding will have for days ceased, and may now be no longer required; and the secretions being excited, carry off in a great degree the stimulant effects of its operations, with an abundance of stuff which, had it remained, would have excited the body to ruinous proceedings. Calomel, therefore, should be administered from the very first in all cases and under all circumstances of Cholera, and in proportion to its showing its constitutional powers, so can we depend on the safety of our patient. I do not mean here in propor-

tion to the extent of the salivation, which it may occasionally induce in a day or so, but I would wish it pushed to this point at the least. It is odd that mercurial fumigations have not been tried in this disease,—do they not seem to promise a small chance of benefit? What would be the effects of introducing some of this into the rectum? Mercury, by restoring the different secretions, opens a way for the more impure parts of the blood: thus it equalizes the state of the circulating mass, as well as, that of the secretions; let us be deceived no longer but let us in a great measure trust to calomel not being afraid of that operation formerly so much dreaded, for it is distinctly believed that at first it will shew none of these powers as a stimulant. In those cases in which stimulants are required we give them also along with the calomel;—but more of this in the proper place.

Previous to leaving the question of blood-letting, there remains something to be said as to the propriety of using the cupping apparatus, and the application of leeches. Many no doubt may be inclined to think that leeches applied to any part of the body, in the treatment of Cholera, are too insignificant to merit much of their attention:—Whatever views may be entertained of this procedure it must be stated that leeches can be most advantageously used in particular states of the system under the attack, and where from some cause or other, we have lost the time for general depletion, or where we dread the consequences of opening a vein, especially in the weak and emaciated, or in those who have been addicted to excesses of various kinds—especially old debauchees. This mode of procedure then I would recommend in all constitutions resembling those of the Native Indians as to innate stamina;

such, however, at an early period, and the sooner the better, provided we cannot venture on the opening a vein for the reasons already noticed. If we imagine that in the case above referred to if we could obtain, a pound or two of blood, and in this way relieve symptoms and turn the tide of affairs in our favour, we cannot do better than have recourse to this mode of abstraction. I know well that many might say that local depletion will be of but little importance since, according to their views, we cannot fulfil the general indications required, and that they would much rather take it away at once from a vein, and thus in many cases effect an instantaneous reduction of the general amount. Now this is the very point to be avoided, for by lowering the powers of the body too quickly, we will not unfrequently do irreparable damage. Leeches, or the cupping glasses, may more willingly be had recourse to, than general depletion, for obvious reasons,—such, as when the body, in this manner, parts readily with its blood, since it will certainly feel the loss much less than by the opposite plan, where, from its employment, we will but too often have to notice the rapid and sudden sinking of the vital powers, as also do great damage by withdrawing from that actually in circulation. Thus, when it will flow from a vein, by being rapidly and forcibly abstracted, the whole powers of the body soon feel its absence, and then we have often to witness the instantaneous sinking of the whole functions, the same as sometimes occurs in other distempers than the one under consideration, where the whole system is so very liable to be depressed from the effects of the general depletion, so that the body even in them is often long in rallying from the positive shock of diminution thus inflicted by a mal-application of the

remedy. Is such a state of things then not more likely to occur in Cholera, in which we often observe every thing producing great exhaustion so likely to overwhelm the vital energies; and when so, we know well the absolute impossibility in very many instances of rousing them even by the best directed use of stimulants, since, in this disease, the whole nervous system is many degrees below par, and must be sunk further by general depletion.

From the above we may observe that consequences by no means so injurious are likely to result from using leeches or the cupping glasses, since these by withdrawing the blood gradatim, and almost imperceptibly from the system, in a great measure relieves the several organs from that congestion which is so apt to injure them in the performance of their actions. Thus the whole are relieved, as it were in a manner satisfactory to themselves and the system, and this procedure tells well in the end as it leaves of course less blood to stagnate; thus the general mass is reduced without interfering much with the actual *tone* of the blood-vessels, a point of no mean importance, for we thereby prevent a speedy tendency to the production or increase of a passive hemorrhage and consequently the formation of the much to be dreaded ominous stools, as well as preserve the system from the sudden shock of diminution, or perchance in the end really abstract from the amount actually in circulation, when the action of the heart will be maintained, at all events will not be so much impeded in its operations,—the load which formerly oppressed it being in a great measure removed. Such then in the constitutions instanced, is more likely to occur when we open a vein and obtain blood, this even in a minor degree, since as supposed the impression is too sudden, and we obtain

the vital fluid from the quantity in actual circulation which is not supplied in proper time from the several organs where it is stagnating; this is greatly owing to the torpid state of the heart itself, and is liable to be increased by such proceedings. But by the local detraction, we allow it time to come from its lurking abodes into the circulating medium and the several organs liable to be oppressed by its presence are gradatim relieved, and the action of the whole is kept up without lowering the quantity in circulation.

When we consider that the larger leeches, particularly those to be had in many parts of India, will, when they act properly, detract blood to the extent of an ounce each, it follows that if three dozens or more are applied, according to their size, to different parts such as dividing them between the belly, breast and temples, or to the nape of the neck, we will at least procure two pounds of blood, and thus, by lessening the general amount, we must have less congestion in the several organs such as the brain, lungs, or other larger viscera. It follows that they should be used under all circumstances of a favourable nature—in all cases where we dare not open a vein, or from which when opened no blood will flow. If the belly is tender and painful in any part, by applying leeches we do a double good, for, independently of removing these symptoms, we have the general benefit as above noticed. When applied to the temples, we reduce the tendency to venous congestion, and thereby prevent a species of compression from such an accumulation of blood; this distended state of the vessels we know to be of but too frequent occurrence in the more severe forms of cholera. If the breathing is oppressed, or if there is pain in the thorax, then they may be usefully employed over the region of the heart, or to the seat of

the disturbance. Nay, if there should not be pain in any of these places, the leeches may be placed over each, as by the local depletion they may in some measure avert the malignant cause in operation from proceeding to such an extent as it might otherwise do. I prefer applying leeches to several parts of the body, as in this way they will be more apt to act well than if they had been all applied to one place. Leeches then will be very properly placed on these several parts at the very commencement of the attack, although there may be no actual pain; since, as the distemper progresses, and we know what the usual consequences are, it ought to be our business to prevent such if possible from taking place, provided we believe that the abstraction of blood will do so.

In applying leeches we may sometimes have much trouble in getting them to fix at once. There is also another point to be noticed, and from which we may observe whether much good is to be derived from their use or not, it is that when they act well, it may be inferred that the circulation is not gone from the surface, and that in such cases we may expect much benefit, particularly if native strength seems inherent, and we will do well to use them in preference to general depletion, and this according to the amount wished to be withdrawn. We may, in the first instance, puncture the skin with a lancet; then we will see whether it bleeds freely or not, or we may use a leech or two, and observe whether they act well or the contrary. The better plan in all cases will be to use the common scarificator for the cupping glasses, and if the punctures bleed freely, by placing a leech on each puncture, it will draw blood at once and soon fill. If we think that the blood is too thick, and that they will not act quickly, then we should either use the cupping glasses to this

part or to another, and we can also have recourse to them or cupping at one and the same time ;—the leeches should always be removed the moment a sufficiency has been withdrawn. I would therefore always use the scarificator in the first instance, and apply the leeches to the orifices, and if they after a time, do not fill well, they may be removed and the cupping glasses used where they were, or to another part of the surface. This applies to whatever place we wish blood to be taken from—whether the temples, nape of the neck, breast or belly. In those cases in which they have done well, and the bites continue to bleed freely, we are sure that the case is a fair one for recovery. In these instances great care is to be observed that too much blood is not lost in this manner, else we run another risk of inducing too much direct debility, from a positive loss of the vital fluid ; which we would not care so greatly about, in some other diseases, where we have the nervous power in a comparatively strong and resisting condition, and not so liable to be acted on from a positive deficit in this respect. If from three to four dozen of a good size have been applied, then the bleeding orifices should be stopped the moment they are removed, this can be accomplished by using spirits of turpentine or spirits of wine, &c., then an immediate recourse to a good sized blister, even over the leech-bites, will prove highly serviceable ; this either to the nape of the neck or belly, or to both parts, according to circumstances, and followed by a good dose of calomel as a sedative. If, after a time, the symptoms become worse, then, if native strength be not too greatly drawn on, the leeches may be again used ; but we must attentively watch the effects likely to be produced.

So much then for leeches at an early period of the at-

tack, and at the favourable time already noticed in the account of general blood-letting; these rules we ought to keep in mind. There are other periods of the disease at which they may be advantageously used, even at a more advanced stage of the attack, where we dare not venture on general depletion, or in cases where the pulse is scarcely to be felt, or when it has altogether gone from the wrists, or where, when a vein is opened, the blood comes away in thick drops, or where it will not flow at all, or where the patient from the moment of invasion is greatly oppressed, yet in many of these instances where the inherent strength is somewhat considerable with severe cramps, pain and stupor of the head, pain in the abdomen, or an oppression of breathing, in all, or any of these they may be usefully applied, particularly in the better constitutions of Europeans, or in the otherwise good habits of body of the Natives, in whom the local depletion, under the majority of circumstances, will be attended with greater success than the opposite plan. I am not so hopeful of these doing good, at a late period, since there has been great accession of functional disorder, and the malady has already advanced beyond all remedial measures of this sort; if used when the symptoms are in active progress, and the vital powers at a low ebb, then we may often have to observe that the loss of even a few ounces in this manner might prove so highly injurious as to sink the patients beyond the rallying point. But in all cases where the strength seems good, and the vital powers appear struggling with an oppressive load, as in cases where we observe the animal heat fluctuating, with an evident attempt at a restoration of the circulation, then they may be usefully employed. In these instances, however, leeches would act too tardily, therefore the

cupping glasses will be the better application ; here we have not much time to lose as the interval betwixt the attempt at re-action and that of dissolution is so short and the system is not very much disposed to tamper long with the cause of oppression, therefore, if not speedily relieved at the critical moment, it sinks beyond the power of medicine.

A point of some magnitude as regards the use of leeches after re-action has come on, when the system has evidently recovered from the first impression of this overpowering disease, and where there is certainly action, although evidently kept back by the congested state of the larger vessels or viscera, yet remains to be noticed ; in many of these cases we anxiously wish to detract blood, in order to remove the pain and stupor about the brain, or the oppression or pain of chest, or abdomen ; but from the tendency of general depletion in this disorder, at these particular times, we are afraid of opening a vein in case the patients might be thrown back into a lethargic condition from which few ever recover. Then, in many such instances, particularly where the body has been previously strong, a cautious and discriminate application of leeches to the most severely pained part, in the first instance, may be attended with the happiest results. The worst symptoms should be attacked first, as by this means we prevent further exhaustion. Then by using from three to six leeches of a good size, and if they act well, and if the circulation does not flag, we are sure of doing good, and in two or three hours, or perhaps less, we may use somewhere near a dozen, and if the pulse, keeps up in the same interval we may apply an equal number to another part. Great care and assiduous attention are required in such proceedings, and we ought never to allow our anxiety

to take precedence of our judgment; and we will not in most cases overstep the bounds prescribed, but avoid doing injury by always recollecting, how readily some patients are thrown back by a too bold procedure, and that our safe course is to feel our way.

When leeches cannot be obtained, or where they do not draw actively, or where, from the restless disposition of the patient, we are prevented in a great measure from applying them to the most favourable places, or where they will not bite at all, from some noxious state of the skin, either proceeding from the nature of the effused fluid, or the thick and altered condition of the blood itself, often poisoning them; under these circumstances an immediate recourse should be had to the scarificator and cupping glasses. But if the blood has left the surface, and retired into the interior recesses, it is evident that we cannot obtain it in either way; then we must trust to our other plans of procedure which are on no account to be laid aside during these measures, and which will be noticed in their proper places. Previous to using the scarificator, it will be proper to rub the part well with dry flannel, or apply fomentations, provided we are not afraid of the injurious consequences of heat, here; however, no great damage will be done since it is only partially used. Thus we may possibly solicit a greater degree of circulation in the parts, and, by a masterly management, may be enabled to obtain the quantity we wish; a blister may then be used. The cupping glasses should be employed in all cases where we find the leeches inactive, as in some instances they might remain for nearly two hours without becoming fully filled. When they are applied at a late period, and the symptoms of Cholera are fully formed, and in active operation, they will

not draw blood, if in fact they will bite at all ; under these states of torpidity in the leeches we can have no hesitation in having an immediate recourse to the glasses, this, however, at all times under the distinct impression, that the abstraction of blood is indispensable to the amelioration of the symptoms.

Having finished this laborious article on blood-letting,—having entered fully into its merits in every respect, not shrinking from any point, and having dwelt at some length on its sedative properties, and its proper application in all stages of the disease, it remains that I should follow up the sedative plan of treatment. It will not be our object to enquire, how far such a mode of procedure is beneficial, in this or that stage, or how far such should be employed as a universal mode in every case. From what has already been advanced any one may gather in how far this is to be put in requisition ;—it will therefore not delay us long. I shall first take the article Opium, as it is that substance in which some might place most confidence, for it is certainly the surest remedy for affecting many indications according to the dose or the frequency of repetition,—we will find that much depends on this point.

SECTION II.

OPIMUM.

Opium, as well as every other sedative, or anti-spasmodic, will be of great utility in certain cases, and stages of Cholera. A question of much moment is, how far ought we to pursue this or any others of this class as a remedy, in what doses, and at what period of the disease, ought they to be administered ? Without proceeding much further in the investigation of this subject, the

more particularly as I have detailed at considerable length the operation of opium on the human constitution, as also of other medicines of the same class, in my essay on dysentery I may here be pardoned the recapitulation of them. Opium, under ordinary circumstances, may be administered with the intention of fulfilling two indications, either as a stimulant or sedative. The stimulant operation will be found to be of little avail in this epidemic much less so than in others, more particularly as we have of this class plenty which are better adapted, and operate with greater certainty than opium: as a stimulant of itself solely to be depended on, nothing therefore will be said. As to its sedative properties, it may be noticed that most men believe it to be the only sedative that they should use in cholera, for giving a *quietus* to the inordinate actions, but in my mind it is a remedy fraught with the most dangerous consequences, and therefore should not be had recourse to with an unsparing hand, or a generous distribution of this powerful drug to all classes attacked. By referring to what has been stated on Tetanus its injurious effects may be in part seen; I say then that opium is by far *too powerful a sedative* to be indiscriminately had recourse to in the generality of cases, especially those of the more severe aspect,—here the powers of the body are greatly oppressed and deadened in their actions, its operation therefore in such cases is too permanent for the indication we ought to have in view. It may be most usefully employed, however, in all cases in which there is a great excess of action from the very first, and when the body is comparatively strong to resist its otherwise injurious effects, more especially in those cases which seem imperatively to demand the operation of blood-letting, so as to reduce the superabundant action in a

robust and powerful constitution, always bearing in mind that if both are employed, we ought to give less of the medicine, as both have a sedative effect, and powerfully so from the very first. This however depends much on the quantum of the opium administered, for if we give forty drops we have by no means such a speedy sedative operation produced, as when we administer from sixty to a hundred, all of these proportions may be required in different instances, according to the severity of the symptoms, as each is calculated for fulfilling some particular indication, and if both remedies be employed together it will be proper to bear this in recollection. Does it not appear exceedingly strange to every one, that in many cases we should bleed with the idea of removing the load of blood which is oppressing the circulation, and as soon as possible after the venesection, give a good dose or doses of opium; with what intention; will such a proceeding not tend to encourage this again to recur? That this is the operation which will take place there can be no doubt. Does the administration and operation of the drug not induce a torpid state of the animal and vital powers? How is this inconsistency of practice to be reconciled; and is it not another cause of our failure? Some may say we give large doses to prevent, or subdue spasmodic actions:—well, granted, these are overcome, in what condition let me ask is the system now—torpid—such is certainly not desirable, for it will positively tend to induce that very venous congestion we ought to have been endeavouring to relieve. Such being apt to occur in certain forms of the epidemic ought to put us on our guard as to its indiscriminate use. There are cases, and these the less severe, in which opium may prove of much utility, such as those more resembling certain dysente-

ric attacks. Opium therefore, independent of bleeding, will certainly allay severe spasmodic action, provided the stomach or alimentary canal has not become quite dead as it were to the impressions, and transmission of medicine through the system. This last is one grand cause of our failure, for we will find, in a great number of cases, after a certain time, that the stomach is totally incapable of transmitting the remedies to the general system; and, if they act at all, they only do so by inducing a greater torpidity in the organs themselves, so that now we may see the real cause why we should not be overfond of sedatives, besides the great advantages to be derived by having the patients to treat at the moment of the formation of the attack.

There is another point to be attended to, which is, whether the opium should be given in a solid or fluid form, especially at the commencement. It may be observed that where there is severe vomiting and purging, the liquid will generally be found the preferable, since part of this must always remain behind, even after another fit of vomiting has occurred, and that it should be administered in such quantities as is commensurate with the intensity of the symptoms, another dose being given in the liquid state immediately after the rejection of the former, we will find that, although this be rejected, yet some of it may remain on the coats of the stomach, even independent of this organ's most strenuous exertions for its expulsion. Thus can we administer it until our object is fully accomplished; do not however, let us overstep the mark, but always keep in mind its *deadening* effects on the vital powers. Some may say that the tincture, by mingling with the fluids of the stomach, would prove of little utility, and would certainly all be thrown off by the vomiting. This to a cer-

tain extent is the fact, but not to the amount we might a priori expect; for although the fluids of the stomach may in a great measure neutralize its powers by becoming blended with them, yet we know that part may pass the pyloric orifice besides coming in contact with the stomach, and in this way get into the system. So that upon every consideration we should give the fluid form, at such intervals as may be deemed proper, and according to the intensity of the attack: nice judgment is required, for if too little be administered, we have not gained our indication, and if too great a dose, we may have done more than is required. Another point to be borne in mind is that whenever we have any severe disease to treat we require to exhibit the medicine more freely than in others of a less severe form. Our patients therefore are capable of bearing a much larger dose in such states of the body than under opposite circumstances. This disease, however, differs from most others, in this, that the whole of the nervous power is assailed, while in these, it is only partially so, and when the excess of action is subdued it leaves the system to recruit itself; whereas in cholera this, in very many instances, will be attended with an opposite effect. There are others who prefer the solid form of administration, this to me does not by any means appear so applicable as the tincture, since it must come less speedily into operation, even granting that the pill was retained on the stomach, and as it dissolves, it would only serve out its action gradatim, and consequently could not come fully into play, at all events for some minutes, so that much damage during this interval might be done. A pill however is more durable in its effects, and is better calculated for those cases in which there is not a great degree of vomiting and purging. As

this subject may not be unworthy of further illustration, it will be proper therefore to consider some of the different spasmodic affections of the system. Hiccup is not unfrequently present in cholera, as well as in other cases in which great injury has been inflicted on the bodily powers ; if severe very few will recover from its influence even in defiance of any mode of treatment. This is evidently shewn in all great operations, when such a state occurs, here as well as in cholera the nervous system has but too frequently received a shock from which it cannot be easily freed. Hiccup under such circumstances therefore I say consists in a spasmodic contraction of the diaphragm caused by some lesion of the phrenic nerves, the disease is thus propagated to other nerves, and in this way becomes more intractable. Hence we meet with this, as a symptom of cholera, but more intense perhaps than in other states of the body, this takes place from the severe irritation that is exciting the nerves of the parts as well as of the general system, from hence the action is quickly propagated to other parts in the immediate vicinity of the organ, in this manner then may a very destructive impression spread from the origin to the extremities of the nervous system, or it may be communicated from the latter to the former ; nay more, we may at times find that a severe attack of singultus sometimes produces a semi-paralytic affection of the body. We dare not perform any capital operation during the continuance of such a state. How then are we to attempt the cure ? The question is at once answered and more readily than the intention can be fulfilled ; by removing the exciting cause. This however, as was formerly noticed does not always remove, or cure the disease, but it may certainly mitigate

it a little. The irritability of the part, or system, being already induced it continues to act notwithstanding the subduction of the exciting cause, but then by its removal, we have more chance of a cure. The remedies to be depended on are anti-spasmodics, these sometimes, as has been stated, will have some effect over the vomiting, or singultus, and they should only be given in *moderate* doses, for where we have too much derangement of nervous power, especially as occurs in Cholera, it will be found that we must attack this *seriatim et gradatim* by moderate doses, as the large ones to a certainty would only further sink, or deaden the animal and vital powers, the more especially when the medicine comes into full play. I think therefore that we should certainly have recourse to those remedies which have the power of keeping the circulation *alive*, at the same time that they moderate or regulate in some considerable degree the irritability existing in the nervous power. By attacking therefore the origin of the nervous system timeously with sinapisms and blisters which if they act we may accomplish some permanent good. It may here be remarked that the external surface of the body in the more severe forms of Cholera soon becomes insensible to the effect of all sorts of stimuli, and it will be found that even the strongest blisters, sinapisms or rubefacients make but little impression. I consider this plan of procedure of much importance, they should be applied to the nape of the neck, down along the spine, over the region of the stomach and even to the soles of the feet; any or all of these places may be selected at times according to the severity of the symptoms but more of this in its proper place. In the mean time to return to opium, I have already stated that opium may be employed at the very

commencement of the attack with much chance of doing good, and that it may overcome the inordinate action of the vomiting and purging, singultus and cramps. Our grand object in its administration is not to overpower the remaining vitality of the system and taking this for our guide we may now perceive the doses applicable to each case. When the bodily powers have been weak, previous to the attack, the stronger doses should be avoided, and also the more potent of the narcotic class,—the more diffusible should be selected. In the more severe forms of the disease we may have there symptoms of long duration, and also of great severity from the first and much of these medicines may be required to quell them ; care therefore should always be observed, that we proportion the doses to the urgency of the case, being cautious not to reduce the nervous power, and along with it that of the sanguiferous system. When this cannot be avoided, others of less injurious powers should be tried as we require remedies to *rouse* not to *depress* these systems, for the symptoms now proceed from debility and not from the stability of the powers of the body. Now neither opium, nor any other anti-spasmodic, is capable of accomplishing this so that we see, if my views are correct, that they should be used with the greatest caution.

But opium is often, and usefully joined to other medicines, the calomel and opium plan now comes under consideration, an extract may be given from the Bombay reports. Mr. Craw observes “ the calomel and “ laudanum plan, with the most powerful diffusible stimuli, and the hot bath, have been eminently successful ; and if application is made within four or six “ hours from the first appearance of the disease, the “ cure is almost certainly effected. It does not appear “ very difficult to *allay the stomach and bowels* ; and it

“ is seldom necessary to repeat the calomel more than
 “ two or three times provided the first dose has been
 “ rejected : but when the stomach is more irritable, the
 “ calomel and solid opium, with confectio rosae forma
 “ boli, is found to answer better than the fluid lauda-
 “ num. The bath after the exhibition of this medicine,
 “ has the most beneficial effect and quiets all the symp-
 “ toms in a wonderful manner. Notwithstanding the
 “ early exhibition of the remedies, the disease yet ap-
 “ pears to run through a kind of course, for the symp-
 “ toms of coldness and a total absence of pulse frequent-
 “ ly take place where there appears to have been but lit-
 “ tle disturbance in the primæ viæ—opium is the most
 “ injurious medicine that can be employed ; the calomel
 “ alone will quiet the stomach (particularly if combined
 “ with previous bleeding and the warm bath,) and that
 “ is the only apparent use of opium.” It may be ob-
 served that to be successful with this treatment, Mr.
 Craw must have met with more tractable cases than
 have since appeared in other quarters of the world, but
 it must be allowed that some of his patients were very
 severely attacked, since we find that there was an ab-
 sence of pulse, &c. *The calomel, by itself, or in combi-*
nation with quinine, I should certainly prefer, as it has a
decidedly sedative effect in scruple doses, I have never
 as yet either in Cholera, or Dysentery, been fond of
 combining it with opium, since I have in general found
 that, where we could expect any benefit from either me-
 dicine, *the calomel always allayed the irritation as*
speedily and more effectually than opium could do. It
 is believed that opium, besides deadening the excitement
 of the nervous powers, extends its influence to the other
 vessels of the intestines, such as the absorbents ;—we are
 thus deprived of that great medium of communication

through which we may expect our remedies actually to act, those especially which require to be taken into the system before they shew their full operation. Hence another cause of failure, particularly in the more aggravated forms, this proceeds from not properly understanding the different indications which our remedies are capable of fulfilling—Calomel in any dose below twenty grains will not act at first as a general stimulant, for it never raises the pulse, we should therefore be very careful of combining it with others which have a sedative property ; thus being put on our guard we will be enabled to proceed with more judgment and determination to our task. There is yet another thing to be remembered in the administration of any remedy, or set of remedies in cholera, whether as anti-spasmodics, narcotics or any of the others ; i. e. that under ordinary circumstances, we should always combine them with some pleasant aromatic, for such we will find raises the *appetite* of the stomach if I may use the expression, and thus we solicit the performance of its functions much better. Whatever therefore has been formerly pleasing and grateful in this respect to our patients will be of the utmost benefit to them now when labouring under such an attack, which certainly requires something of this nature. We ought therefore, to roll our pills of opium, calomel, or other medicines in this shape, in cinnamon oil, or any other pleasant aromatic, or mix them with aromatic confection, or administer them in the form of draughts, for we should remember these are generally acceptable to the patient. Besides their properties of soliciting the action of the stomach, they have also a powerful tendency in preventing such medicines from either nauseating or griping, if such would be likely to do so. As to Opium I have again to say that this should

be given so as to avoid the future evils that may be likely to ensue from its too permanent sedative effects, and that we must proportion our doses to the severity of the symptoms, always recollecting that our caveat in this respect applies powerfully in regard of the more malignant and severe cases, since we will find that they bear the administration of the remedy worse than the other forms of the disease. Those cases which shew a greater degree of action from the first, as evinced by the severe spasmodic affections, bear its administration much better even from the extent of from forty to eight drops or upwards. It is impossible to lay down precise rules for our guidance in such instances. I do not therefore attempt it. *We should always combine calomel, or perhaps it would be better to give it in addition to the other medicines, and this too from the very first,* the sooner we get this to affect the system the greater the chance of a successful termination. So much then for a brief consideration of the Calomel and Opium plan. There has been matter perhaps foreign to this place introduced, but its importance will plead an excuse.

Dr. Kennedy observes that in “ mild cholera, the
 “ action of the intestines is regular, natural, and with-
 “ out convulsion; but in the severe form of the dis-
 “ ease the whole business of the animal system seems,
 “ for the moment, to be the reduction of the nervous
 “ irritation.” In such cases as the first we have not much to do, only to solicit the intestines to their natural secretion, which is not to be accomplished by opium, or is this by the same remedy to be done in the more severe forms of the disease, to this point then ought we at all times to have our attention directed. It is much to be wished that cholera would again as-

sume such a favourable appearance in every case of the milder form of attack. If the Doctor means all instances of bowel complaints, as occurring about this particular period, to be cholera ones, he is certainly not far out in the detail, and I can really see no solid reason why they should not be counted on as such in making up the numerical strength of our sick lists. The rectifying the secretions of the intestines under such circumstances we do not always find an easy matter, shewing evidently that there is a something more potent in them than occurs in common cases of diarrhæas at other periods. If under these circumstances some of these patients incautiously expose themselves, we will find that distinct cases of cholera are soon manifested. It is perhaps useless to observe that opium cannot in general restore the natural secretions. We have seen that the secretions of the whole body depend on a perfect play of the nervous power, as well as the due distribution of the blood, which opium only tends to throw into greater disorder. Any cause therefore capable of affecting either, at such a critical crisis, will derange to the same extent the parts which they supply, and it is useless to observe that when both are impaired so much the more destruction will take place. From this it follows that where the cause is general as it is in cholera, we have much to contend against, and that opium is certainly not the remedy for this evil. Let none talk concerning the astringent virtues of opium for checking the inordinate drain that is now established in the system, since its other powers far outbalance this, which as they come first into play, would render it dangerous to use the drug as an astringent. There is one symptom, which not unfrequently attends the disease when reaction is about to take place, and it is the great ten-

dency to sleep. Some disorders are aggravated by this as in epilepsy, great care therefore must be observed that we do not give much opium. I formerly observed that this took place where there had been no opium given, and even independent of this. Opium therefore, if administered to a great extent, might possibly produce the sleep of death. There is yet another important point to be attended to, and that is the habits of our patients in respect to the use of sedatives. It would be folly to prescribe the same dose for one who had been in the constant habit of using opium, such as by smoking, &c. as we would order for another who had not so indulged. Is there any one that would bleed a patient who had swallowed large doses of opium, as a person under ordinary circumstances, would he not rather try and eject it from the body and then work its effects off by other means. I believe that none would do so, if any did they would find that the patient would as inevitably sink as he would do in the collapse of cholera, where if we could also obtain blood it would only hasten the case faster out of existence. I view the collapse of cholera, as regards the nervous powers, in some extent the same light as when a person is labouring under the oppressions of large doses of laudanum. The *dolichos pruriens* might therefore at times be of use, as it would tend to keep up the action on the skin, when it is not insensible to its operation. Opium may be usefully combined with wine, as madeira, port, or sherry, and with peppers, about half a grain to each wine glass, if given *warm* it will be often found of much service. Camellian oil is most usefully combined with opium, a drop or two to every half grain, and this administered according to the severity of the symptoms, every half hour, hour, or two hours. In drawing a conclusion to the article Opium it may not be out of place partly to recapit-

tulate what has been advanced as to the administration of the drug. I have noticed that opium is capable of operating in two ways, directly stimulating, and directly sedative, according to the quantum given. The first power of the medicine is produced by administering a small dose, whereas, as we all know a large one will remove all spasmodic affections, hence we find a direct sedative effect, or at all events the stimulating operation is so transient, as to be scarcely observed. By giving fifteen or twenty drops, in any other severe spasmodic disease, we produce excitement of the body, and consequently may increase the tendency to the continuance of spasmodic action, whereas, sixty to one hundred would allay this at once. By observing these rules, and taking into account, that when small doses are given, and in quick succession, we will in the end have an equal effect produced as if we administered a large dose at once, hence it follows that we must graduate the remedy to the state of the constitution. Some may ask is it not better to give a good dose at the first, so as to subdue instantly all spasmodic action? When our patient is stout, and of a robust body, we will gain much by such measures, for, in this way, we save the patient's strength, a point of no small importance in the treatment of the diseases of this class, for, were the spasms allowed to continue, they must wear out much of the native resisting power of the body. When then we can with propriety venture on large doses from the first it will be advantageous to do so, but, as has already been observed, with the utmost caution and solicitude, for the after consequences, we should not be too timorous, either extreme however is to be avoided. Perceiving that the administration of opium is attended with so many ill consequences, let us see if there are not other

medicines which can be employed with more chance of doing good. I shall go on therefore with the consideration of the class of sedatives, or anti-spasmodics, and it is imagined that others will be found of less injurious operation, and, at the same time, attended with equal powers as the opium, and I conceive better adapted to such purposes.

MUSK.—This is a very useful medicine, and when good the most powerful perhaps of all the anti-spasmodics, as is evinced by its subduing the most severe cramps of stomach, subsultus tendinum, hiccup, especially in tetanic affections. The operation of this medicine on the nervous system does not appear to me to be so decidedly injurious as that of opium, we may therefore judiciously combine it with calomel, nay even with opium, when so, we will find the combination of the two, or of all three most useful ; when given by itself it must be in pretty large doses, of from five to twenty grains, according to the urgency of symptoms. The medicine has fallen into great disrepute on account of its not being used when new and good. It is fortunate that we can give it in a liquid form, and that its solvent (sulphuric æther) is also a highly useful anti-spasmodic. When the stomach is so irritable that medicine cannot be retained, we will find that musk is equally powerful when thrown up the rectum, a drachm of this tincture, to an ounce, or an ounce and a half, of some bland mixture will answer the purpose.

SULPHURIC ÆTHER.—Is a highly diffusible, as well as local stimulant, it *raises* the pulse even in cases of low typhus fever, in which wine has been found unsuccessful, and is extremely serviceable in spasmodic affections of the alimentary canal, as well as, in all other se-

vere actions of this kind. In the administration of this important medicine there is one point we will do well to bear in recollection, that its action is soon over, and that it is followed by much languor and debility, for the system, by becoming habituated to its influence, requires a gradually increasing dose to stimulate it to action. It is a remedy peculiarly well adapted to the early proceedings, in the speedy subduction of spasmodic action, if we only bear in mind that *after* the more effective part of its operation is over, it *depresses* the powers of the body, but this can be remedied by other articles according to the extent demanded by the sanguiferous and nervous systems. The musk, and sulphuric æther, or this and opium will be found very serviceable in all forms of the complaint, but more particularly when the powers of the body seem much above par, when we will find that one or perhaps two good doses will abate all spasm, and by this judicious proceeding we will save much of our patients strength, whereas, when used later in the attack, its operation will only add to the existing debility. Small doses of æther repeated according to circumstances, will be found serviceable in those cases of a nugatory description, and be it remembered that *in no case should we give sedatives after the spasmodic actions have been subdued*, unless perhaps, where we have much action, as evinced by the state of the circulation. In those instances in which there appears to be a tendency to severe depression, after the spasmodic affections have yielded, we may gain much by the addition of a few drops of cinnamon oil, the action of the oil is a stimulant, but of a more durable nature, it also raises the pulse, and tends to keep up the circulation. In many cases we will not find it very difficult to allay the irritability of the system, as also, the vomiting

and purging ; our object therefore should be rather to mitigate action than entirely to subdue it. May such not at times be accomplished by the application of blisters, rubefacients, &c., even before the cramps shew themselves ?—thus, being thoroughly aware of the course the enemy may pursue, like a prudent General, we will be enabled to anticipate, and save much trouble and inconvenience, if not actually the lives of our men. I may mention, ere leaving the subject of æther, that the Nitric, although not by any means so powerful, may be most usefully combined with ammonia and opium, for the same purposes.

CAMPHOR.—Is another article from which we may derive much benefit, some regard this as a direct sedative, it has little operation on the circulation at first. It is, however, endowed with the power of a constitutional and local stimulant, and is more readily retained by the stomach in a liquid form ; for this purpose vinegar is perhaps the best solvent, as we find it to be in the low delirium of typhus, in which opium has failed to conciliate the system, equal parts of vinegar and camphor will be the best proportion for administration. If we give the camphorated radical vinegar it must be in very small doses, as it is apt to act as an escarotic. The camphor, however, is most generally combined with other remedies such as opium, musk, sulphuric æther, &c. and when so, we will find it to be a most useful combination. Camphor, be it recollected, is a most excellent corrigent to other medicines, and may be usefully joined with castor oil, &c. in place of the tincture of opium.

THE AMMONIATED TINCTURE OF VALERIAN.—Is another most useful anti-spasmodic, and I am astonished that this remedy should have been so much overlooked in the

treatment of cholera, the more especially when we observe its powerful effects in the subduction of the severe spasms in epileptic cases. When joined to other anti-spasmodics we will observe it very successful in the removal of severe cramps of the stomach especially when joined to the—

ASSAFŒTIDA.—In tincture. This medicine we know to be extremely useful in all spasmodic affections of the alimentary canal, and I believe it is one of the best substitutes for opium. By the early subduction of spasmodic action in the intestinal tube, we may possibly prevent any occurring in the extremities, for I have shewn that this action is communicated from one portion of the body to another. If assafœtida be rubbed up with ammonia, we obtain a very fine powder, and thus we can form pills, with the addition of cinnamon oil, or any of the other more powerful aromatics, which we will find most useful in the treatment of all cholera cases. This powder, in combination with opium, and a few drops of any of these oils, will also be found highly useful. Say four grains of the above powder to one of opium, and a few drops of oil, or a few grains of any of the more pungent of the peppers, to each pill, if too bulky, when made with the latter ingredients, then they can be divided and given at once. One of these pills therefore, according to the intensity of the spasmodic actions, every half hour, hour, or two hours will be a most judicious mode of procedure, these administered as long as the strength of the spasm remains obstinate. Care must be taken that too great a quantity of opium is not thrown into the stomach, even in this manner, which can be avoided by substituting the pills of assafœtida without the opium, even then they may

be also composed of more of the former article—this may be done alternately. If the patient, as sometimes happens, cannot swallow pills then it will be necessary to administer the medicine with mucilage or confectio aromat : either of these should be in general the vehicle, for most of our remedies, when given in draughts, or we may prefer the confectio rosæ which will also be found to answer well.

It may again be observed, in respect of the aromatics, that they are a most useful class of remedies, being well calculated for fulfilling many very important indications in the treatment, and that they are not the inefficient medicines many medico's suppose them to be. The black and white peppers do not heat the body, nor do they raise the pulse, but they are given with various remedies for the express purpose of proving agreeable to the stomach, a point of no mean importance, thus they will greatly assist in calling into activity the very powers required to promote the operation of other more important medicines ; they may be considered as a kind of skirmishing party preparing the way for the more effectual combatants. They may be also very serviceably employed externally, as a sort of rubefacients, spread on mustard, whose power they will greatly increase. The essential oil of cinnamon may be most conveniently used with the addition of turpentine, and applied as external *stimulants and sedatives*. These oils, when joined with opium, will also be found very serviceable as *stimulating anti-spasmodics* given internally. Ginger in powder or the infusion or decoction, will also be serviceable. The sulphate of magnesia may be very advantageously given in a proper proportion of any of the two last forms when our views are to act on the bowels, or the powder in pretty large

quantity joined to rhubarb, or any other purgative ; ten to twenty grains of ginger with any of these remedies according to the existing torpor of the body. Let none be afraid of producing a state of inflamed bowels or stomach, under such circumstances for we will find that this is positively more likely to arise from the actual torpor in existence, to avoid which we require a gently stimulating remedy. I may here say that much, very much harm has been done by pursuing a mode of practice applicable to an inflamed state of these parts, and I believe it to be another cause of our failure, I again take the opportunity of referring to the essay on dysentery where my views are fully explained on this most important, and highly interesting subject. Nutmegs in powder are a most beneficial and grateful sedative remedy ; in large doses, they prevent griping and colic pains, and besides are endowed with narcotic properties. The powder, when added to the ammoniated tincture of valerian, prevents it nauseating, and is one of its best corrigents. From what has been advanced generally as to the class of sedatives, and anti-spasmodics, in addition to that of opium, it is imagined that we have a very nice selection, and that we can in very many instances successfully treat the cholera without the aid of opium itself. It is deemed necessary to dwell longer on such, since from what has been advanced, each practitioner will be enabled to select that which pleases him best. It now seems proper to prosecute the enquiry as to those other remedies which may be employed with the intention of subduing the vomiting and purging as also the cramps. I return to one medicine frequently noticed, for the purpose of more particularly pointing out its various properties.

SECTION III.

CALOMEL.

This subject will not detain us long, as we have already had frequent occasion to point out the general effects of the medicine, as also the propriety of having recourse to it, from the very commencement of the attack. Independent of its sedative powers, it is that very medicine on which our greatest reliance can be placed for the successful issue of the affair. When it comes into operation it puts into activity every secretion of the body, this then is the very point upon which our chief reliance is to be placed, and if, during the premonitory symptoms of the more mild forms of the epidemic, we can get our patient's mouth affected, so much the more certain are we of a successful termination, although I have witnessed some few instances in which severe symptoms occurred at this otherwise auspicious period. We have ample proof of the salutary operation of this remedy, either when employed by itself, or in combination with other medicines. In the less severe forms of Cholera we will gain very much advantage by adopting the plan pursued by Mr. Corbyn. Immediately on the patient being seized, he administered fifteen grains of calomel, which was placed on the tongue, and washed down with sixty drops of laudanum, and twenty drops of peppermint, in two ounces of water. He adds that it was indeed a consoling sight to observe the wonderful change, the vomiting and purging stopped, the spasms removed, with general moisture on the skin and the patient experienced sound sleep, the pulse also having

returned at the wrist. I should, for the reasons already given, have preferred some other sedative than opium, and it is imagined that now a-days our chances of cure would have been much greater than we can boast of: Calomel of itself is a most powerful sedative in from fifteen to twenty grains, and as has been already observed it can in some instances be positively more relied on than opium, for we will not unfrequently find that we will be successful with the former in allaying severe action of the system which the latter could not accomplish; nay that such might have actually increased it, every one of sound practical knowledge in the East can bear ample testimony to this point. Mr. C. observes that calomel, in a dose of from five to eight grains, excites lassitude, sickness, irritation of the bowels, and, on account of its being a stimulant, acts as a good purgative. It is much to be desired, (especially in this disease) that calomel, or any other mercurial preparation, unless perhaps that of fumigation, would act as a general stimulant on its first exhibition, and before the system has been some time under its influence, it may, however, possibly be possessed of a local power in this latter way, and thus, by calling into more active operation the circulation through the more minute vessels of the intestines, congested as they may be, or perhaps approaching to inflammation, not only remove a source of irritation, but may even change the nature of the secretions, and place the parts in a condition to return to their natural state. But as to its stimulant operation on the general frame, on its first exhibition, I am firmly of opinion that this is an error of severe magnitude which has misled the medical profession for a very long time, not that I am desirous of being considered wiser than others in the above statement; its operation, however, in this respect I uphold

and any one who pleases may put it to the test of experiment. But that calomel in a dose of from fifteen to twenty grains acts as a local and constitutional sedative, it allays vomiting, removes spasm, sends the patient to sleep and in general only produces one or two motions can be abundantly testified by all. I have observed elsewhere that Dr. Latham gave the calomel in large doses with great success, when his patients were melting away from the purging, and had got no sleep for nights previous to the administration of this most potent medicine, but slept soundly on the night of the day in which it was given. So may we expect it to act in Cholera. Of one hundred and ten patients treated in this manner by Mr. C. he only lost two, these were decrepit aged men in whom the vital energies were at once extinguished. If as has been said any medicine can be called a specific in this disease, calomel certainly deserves the appellation. Another point is how would it do to substitute mercurial frictions for the part performance of our rubefacient mode of practice, it is thought that this would be most usefully had recourse to, as by this means we could get much more introduced into the system for a greater extent of the medicine would be exposed to the action of the absorbents ; in this way then we might have much more introduced into the body, provided these vessels are in action. This practice it is believed has not hitherto been tried, it promises some good, and it could be used without detracting from the more effectual modes. Friction of the body, or part of it, is at all times useful, even supposing there were no spasmodic actions to subdue, for by it we will in some degree keep the circulation alive. It is believed that friction along the spinal cord would be exceedingly beneficial, as well as, where the cramps occur, by which means plenty of

the mineral will be introduced, provided the action of the absorbent system be not too much impaired. We cannot expect this plan of procedure to answer very well in those cases in which the nervous system is greatly oppressed from the very commencement, for here we want other powers to rouse the system into active operation, for be it again stated that *mercury never raises the pulse until there is a good proportion in the system*, which will not take place in severe epidemic disease for some days at least. Previous to leaving the subject it may not be improper to notice a most useful combination. If my views of cholera are correct, as to its being a disease operating entirely upon the nervous system, and this shewing the various occurrences which we observe to take place, according to the extent of the operating cause, and if this be induced by marsh miasm, or atmospherical vicissitudes; it follows from this that we should employ some remedies of known power over the nervous system, as is the case particularly in those disorders arising from the same source such as intermittent or bilious remittent fevers, &c. Upon these views then, a very proper combination will be found to be calomel with the sulphate of quinine, administered in all cases from the very commencement of the attack, and this according to the urgency of symptoms; the quinine in, at least, from three to five grain doses every hour, or two hours, with the calomel according to circumstances, and joined to some pleasant aromatic. From the above we may promise ourselves great benefit, in particular in those cases of loose bowels at the time the epidemic is raging. This practice will not only serve to keep up, but restore the powers of the alimentary canal, thus at all times operating on them, without sinking the bodily powers, such a procedure should always be resorted to

from the very period of convalescence. The bluepill, in cases of less intensity, may be most usefully substituted for the calomel. There are other remedies, of nearly equal efficacy with quinine, which can be given in these disorders for fulfilling the same indications, but it is unnecessary to enter into any details of such, as they are perhaps abundantly evident to all, my only object being to point out the proper rules for our guidance, and such is rendered in a manner unnecessary as my views on this subject are pretty fully illustrated in the other essay, to which I refer for a more copious account of the action of calomel, &c. Such then briefly stated are my views of calomel as to its *modus operandi* in this disorder, the time when it should be had recourse to, the doses in which it should be given, and the great and decided benefits to be derived from its proper administration.

SECTION IV.

STIMULANTS.

We may now turn our attention to another mode of treatment, which I will in part shew to be merely the anti-spasmodic plan under a different appellation, especially as applied to the treatment of cholera. There are many who pursue both modes with success as might be expected, from the nature of the epidemic, and it is believed every discriminating practitioner would be inclined to follow a combination of the two. Some advocate the stimulating procedure alone, and of course it is, what

they chiefly depend on. There are many medicines of this class from which benefit can be derived, according to the various indications to be fulfilled, our choice lies between alcohol in its pure state, and its various combinations. We have also our choice among the volatile alkali, camphor, æther and stimulating embrocations. Our object, especially in the more severe forms of the attack, is to support the strength, restore the activity of the moving powers, and latterly the healthy action of the alimentary canal, as well as the other secretions. We will find many medicines in the materia medica well calculated for effecting these several indications.

The first of the class of stimulant to be noticed is——
PORT WINE.—By the judicious or well timed application of such a stimulant as this, we will frequently turn the hesitating state of the body in our own favour, or break the balancing power between severe disease, and that of a light attack. Then adopting this practice at the favourable time when the disease is of short standing, attended with an evident tendency to the stage of collapse, or at the very moment the coldness of the skin is just manifesting itself, we will be sure of saving many lives; this mode of procedure applies to all stages of cholera, but particularly to the more severe forms of the disease. Port wine I consider an excellent remedy, much more so than Brandy or other spirits, these however are by no means to be overlooked as general articles in the treatment. Cholera, in many instances, is of a nature to demand the very strongest stimulants which, when employed, may, and do occasionally save lives. But these, when used in any considerable quantity, are as we know woefully deficient as a means even of relief in very many instances. Who has not seen cases of the more invete-

rate description gradually sink in despite of all our endeavours in this way? I am inclined to attribute one cause of our failure to the lateness of the time, at which we make our advances on the system with them, for they are not generally employed until the very period when the symptoms imperatively demand their exhibition. Would it not be a much wiser plan of procedure to *prevent* such from taking place, than to have the enemy to beat out of his fortress, when now our stimulants can only be used as a forlorn hope, and which may sometimes succeed. Those who are inclined to have recourse to Port wine will do well to join some pleasant aromatic with it, as powder of nutmegs. I have a very high opinion of this as a remedy, and would not hesitate to administer two or three wine glassful, with a little hot water and sugar, and twenty to thirty grains of the powder of nutmegs, as a draught, at the very moment of the formation of the attack, especially when the epidemic appears to be raging severely, and follow this up by a scruple of calomel, if the stomach can bear it. It is not likely that the stomach will reject this at the early period of exhibition, for it is not as yet very irritable. The majority of cases to be saved by stimulants will, it may be observed, be such as require no stronger than the above, which can be repeated according to circumstances. The chances are that one draught will set the whole powers in motion, and we may possibly have a *natural* perspiration as the result which can be kept up by another medicine; thus we either defeat the disease at the very onset, or turn the attack into one of a mild nature, observing at all times to use our large doses of calomel with quinine every two, three, or four hours as may be requisite. But, be it recollected, I do not condemn the use of the more diffusible

stimuli, so far from 'it, that no case should be allowed to escape us, in which every measure is not attempted for the palliation of symptoms ; in this, as a matter of course, we must be guided according to circumstances.

Besides the port wine we have the whole class of spirits, as whiskey, rum, brandy, gin, arrack, alcohol, sherry and madeira wines, &c. It may be proper to make a few very brief remarks on some of them, as a more extended view of the subject will shortly be given. Few would employ pure alcohol in the treatment :—it is the most powerful of all the local and constitutional remedies of this class, and would raise the pulse in any case, in which the nervous power is not over and above oppressed. We ought to recollect its powerful sedative properties, after its stimulant operation is over ; now, if great care is not taken, it will *depress* powerfully, although therefore at first view, it might appear a very desirable remedy, yet we will not find it well adapted for the treatment of Cholera. The others, as they contain less of this property, may be more usefully employed, their doses being according to the severity of the symptoms and our choice lies from brandy to the lighter wines. This is not to be lost sight of for we ought at all times to use no stronger force than the severity of the symptoms seems to indicate. In Scotland, a well known remedy for the relief of severe cramps of the stomach is found in whiskey and black pepper administered with some hot water and sugar ; this is the manner in which we should administer all the remedies of this class, the aromatic should be of a sort the most agreeable to our patient. These remedies are often used against spasmodic affections of the stomach and bowels, from retrocedent gout ; in Cholera, therefore, do they not promise equal chance of benefit, they are often more beneficial than wine for this

purpose and relieve the cramps more effectually. Wine particularly, the port is very useful in certain hemorrhagies, and accordingly should prove very useful in Cholera, when the ominous stools are present, which, as formerly noticed, I believe to be caused from a something analogous to the above action. It may be said to be highly serviceable in the whole range of asthenic disorders, from the lowest to the highest pitch of debility, when it raises the pulse then we give it according to circumstances. Some may ask the difference between the lowest and highest pitch of debility, my answer is, that the expression is more forcible, than strictly correct. To illustrate some points connected with the exhibition of stimulants, I cannot do better than extract a rather important case from my notes.

The patient was about the middle period of life, a seaman of a stout, plethoric habit, and in short appeared to be the strongest man amongst a ship's company of 560. He was seized with vomiting and purging on the morning of the 29th October 1832. The vomiting and purging had continued at intervals from the time he was attacked till his application, (a period of about three hours) at 7h. 30m. A. M. the countenance was truly anxious, with much mental depression, considerable irritability of body, fifteen grains of calomel were immediately administered and remained on the stomach till 8—30 A. M. when he again vomited several times in succession; this even continued while at stool. Little was passed, the ejected matter was of a dark dirty congee or watery appearance; and our first case of Cholera. The temperature of the body felt *above* that of the natural standard, and the pulse was moderately good. Under these circumstances he was bled, with the view of turning the tide of affairs,—a more favourable case could not possibly

have been apparently selected for the operation. In order to allay vomiting and purging, and the other symptoms, he had immediately after the venesection (about ten ounces were abstracted, when I dared not proceed from the sinking of the pulse) a drachm of tincture of opium; this was retained for a short time, twenty grains of calomel were then given which remained, notwithstanding the repeated vomiting for some time; this action was severe and as soon as more medicine could be consistently administered he had, at 10 A. M. calomel gr. xxx. pil opii gr. ii. which remained for half an hour. The depression of body and mind was now great, for while at stool syncope occurred. The alteration of pulse within the last few minutes is as surprising, as its sudden decrease is remarkable, it is now very feeble and scarcely to be felt, although it had continued pretty good all along, the skin is cold, and reminds me strongly of the sensation conveyed by handling a subject in the dissecting-room, even in winter, this sensation particularly evident about the extremities (the Surgeon of the ship who was absent on duty made his appearance about this time :) the lips were now assuming the pale hue, as well as the blueness under the nails. It may be remarked that during the venesection the blood flowed pretty freely at the beginning, but at length came away by drops, after the arm was tied up the pulse again rose. About 10 $\frac{1}{2}$. 10 $\frac{1}{2}$ m. another vein was opened on the opposite arm, from which independent of the now low state of the pulse, nearly a pound of blood was obtained. The spasmodic affections which came on about an hour back are still present, although less severe and of shorter duration, with occasional vomiting. At this period a stool every ten minutes of a wheyish appearance with white flocculent shreds in it, the matter vomited has exactly

the same colour but fewer of the flocculent *meteriel* floating in it. At 11h. 23m. A. M. ol. cajeputi gtts. xxxx. Tincture opii gtts. xxxx, this was retained upwards of twenty minutes and during this period no stool. Now no spasms, in the arms and these but very partially in the legs and of short duration. 11m. 45h. A. M. The cramps of arms and legs rather more severe but they do not continue long, the spasmodic affections in this case first commenced in the armpits, 12h. noon—again purged and vomited, repeated the cajeput oil and opium as before, and he retained the medicine for a considerable time, during this period has not been tormented by cramps, or the vomiting and purging ;—the skin of the extremities of an icy coldness. The forehead, as well as every other part of the body, has been covered for some time back with a cold clammy sort of perspiration. Features much shrunk, with the livid circle around the eyelids deeply marked, the eye-balls much retracted. Bottles filled with hot-water were now placed between the legs, arms, under the pillow, and around the body, which raised a heat different to the feeling, than that conveyed by the parts when possessed of their natural sensations, about half an hour after their application the legs were dry, but the *animal heat* seems all but gone from the extremities, which however continues about the neck, thorax, and abdomen but somewhat reduced. 1 P. M. Comparatively comfortable to what he has been for the last two hours at least, now no vomiting or purging, the only annoyance complained of is thirst, and with this he is grievously harassed, has drink at short intervals, care being taken not to overload the stomach with too much fluid. To have a table spoonful of brandy and an equal proportion of barley water, hot every ten minutes or quarter of an hour. Pulse gone from the wrist and

ankles for the last half hour. 2h. 15m. p. m. The artificial heat produces only that effect which I think it capable of doing, but the animal heat seems to have entirely gone from the extremities, and most parts of the surface. The arms and legs are dry, and he complains of coldness in them, no vomiting or purging since last report, the cramps of arms and legs but slight, occurring at pretty long intervals, 2h.—30m. p. m. A large mustard sinapism over the abdomen, a quantity of calomel rubbed on the tongue, and the brandy as above regularly continued. 3 p. m. Calomel again rubbed on the tongue and washed down with the brandy and water as formerly. About this time re-action seemed to come on, for there was an evident restoration of animal heat, and an effort of the system to get rid of the oppressing cause, the constitution seems however to be very weak. The sinapism gives much uneasiness, to be kept on as long as he can bear it. Becoming again more restless, so much so that at 4 p. m. the bottles of hot water, which had been filled again in the interim of the reports, were obliged to be removed, as also the sinapism. 4h. 30m. p. m. Rubbed calomel again on the tongue, and washed it down with the brandy, which has been continued as first noticed. Another sinapism is now applied more over the scrobiculis cordis, including part of the thorax and abdomen. The respiration which formerly continued free, in a manner up to this time, is becoming slow and hurried. Irritability of body with jactitation increases, and every symptom now portends speedy dissolution. 5l—5 p. m. *e vita decessit*. A very few seconds after, the right side foot perceptibly moved as also the muscles of the inside of the thigh of the same side. The left thigh and foot presented something of the same appearance, as also the muscles of the lower jaw. The muscles of these

several parts appear as if they were under the influence of some galvanic power, resembling the effects produced on the naked muscles of a frog's leg, from the application of something of a similar nature. Such then is the history of rather an important case transcribed from the rough journal of the ship, as drawn up by me; and it is to be hoped that the arrangement will not be found fault with, considering the severe and very laborious day and night duties I had to perform at this period,—being the only assistant on board when the epidemic was raging. One day I presented a sick list of no fewer than 80 men, consequently had only time to put down in this, as well as all the other more important cases, the more urgent symptoms. In my note book I find the following remarks appended to this case. The above was certainly a well marked instance of cholera, from the very first, although the livid circle around the eyelids, lips, and under the nails was not strongly portrayed till towards the conclusion, when the rugose and whitened appearance of the fingers and toes was strongly marked. The other symptoms were decidedly characteristic, the countenance very soon became deeply Hippocratic. The cramps were not very severe and could always be alleviated by liniments. This was apparently a most favourable case for blood-letting, and it was imagined that some good was derived from its use, but this was only triflingly so, as the patient appeared to sink rapidly after. Do we not also observe that the moment the balance of power, as given to the system by the blood, is broken, that the dejections now assumed the determined and much to be dreaded ominous colour. The heat of the body also in part returned at one time, although the pulse was never perceptible after it had left the extremities. Does this not clearly shew that the

blood at all events is not the medium through which the heat is given to the body? The oscillatory action of the muscles, as above stated, was very distinctly marked, so much so indeed, as induced some of the bystanders to exclaim; "he is not dead yet, sir, look how his feet, legs, and lips move." This was certainly very striking, and it may be imagined to have been an attempt to throw off the remaining vitality of the nervous power, which was evidently not quite exhausted. The sinking, in this case, was particularly well marked, soon after his admission, we observed syncope to occur while at stool. Many such cases could be given, in which stimulants, calomel and blood-letting, were had recourse to, and the first named in a much more powerful form than in this case.

It may, however, suffice to give an outline of the practice I adopted on board the *Arrogant Hulk*;—the circumstances under which these patients were received have already been stated. It was pleasing to mark the effects of the following mixtures on the circulation of most of the eight moribund cases, in which the pulse had been absent for some time, in some of them. The following was prepared and administered.

Rx Liquor ammoniæ puræ ʒiss

Ol. menth. pip. gtts. xxiv

Aq. cinnam. fort. ʒiii

ʒii a dose alternated with the following—

Rx Ol : Cajeputi. ʒss

Tk. opii ʒss

Aq. menth. pip. fort. ʒiii—— ʒii for the dose.

The ammonia mixture was first given, and then, at the interval of half an hour, the other. Soon after the first dose was administered, I went again round to their several beds, and found something like a fluttering of

the pulse at the wrists of those in whom it had been entirely absent. These doses on being twice or thrice repeated, rendered the pulse more perceptible in those that had but a bare continuance of the circulation from the first, and evidently *restored* it to those in whom it had been entirely absent. I found, from a close attention, that the effects of the medicines began to wear off in the space of half an hour, and consequently had recourse to each according to circumstances, and thus managed to keep the pulse going for some time. After a period, these medicines lost their stimulating properties in a great degree, when I had recourse to brandy with warm water in ounce and two ounce doses, according to the severity of the symptoms, in each particular case. I soon perceived that no medicine with which I was acquainted, would prove of any avail, and only lamented that the patients should have been in such a confined space. At first, considerable hopes were entertained that some of them might be saved; but no, the cause remaining in active operation, although the symptoms had been relieved, only added certain destruction to all of them. It is to be regretted that something else had not been substituted for opium, it was added under the idea of relieving the vomiting, purging and spasmodic actions. My views, as to the nature and treatment of cholera, were not then so extended as at present.

It may be proper to enquire into the operation of some other stimulants, and state in as concise a manner as possible their various powers. The AMMONIA is possessed of local and constitutional effects, and may be used in the solid or liquid form. It may be made into pills with camphor, and usefully administered in many cases. In the liquid form it is a rapidly diffusible stimulant, and joined with alcohol, it may occasionally be

given in the more inveterate cases so as to keep up the action of the nervous system, or raise it when deficient. A better way of giving ammonia is to join the carbonate to assafœtida, then we have a most useful medicine which might even supercede the use of opium : Cajeput oil is a highly stimulating remedy possessed also of some purgative powers. It answers extremely well as a *local* stimulant, and may be given internally as above, or in any other convenient form. It has no other properties when given internally with which I am acquainted, we will find it useful in allaying the vomiting, and consequently the tendency to the cramps. It also does uncommonly well as a rubefacient, and is perhaps amongst the best we can use, its *heating* powers render it remarkably useful even in other diseases than cholera,—such as chronic rheumatism, &c. It may also be beneficially joined to enemas, from which we will often obtain decided benefit.—The essential, oil of savine—is a strong stimulant acting both locally and constitutionally ;—when given internally, it is possessed also of anti-spasmodic properties. The oil of savine, or rue are most beneficially employed with liniments, since they have sedative qualities. There is another medicine from which we may certainly expect some good, it is one of the aromatics, and the most acrid of them all.—Capsicum—or cayenne pepper. This, in tincture, is a most powerful stimulant, often very beneficially administered for cramps of the stomach, and seems wonderfully well adapted for many cases of this disease. It may be given in the form of tincture to the extent of twenty to thirty drops or more ;—repeated, according to the urgency of the symptoms, or alternated with other remedies. The strong vinegar of capsicum may be used for the same ends. It may be often very beneficially employed ex-

ternally, in powder, or the vinegar of it will add much to the biting effects of mustard, and if there be any action in the skin, this will prove very serviceable ; the mustard may be made with the *heated* vinegar which, will also greatly improve the former. We must take care when we administer this, or any other of the more potent stimulants, that they be only given to the extent demanded by the urgency of the symptoms. If, on re-action taking place, there be too great a quantity of these medicines in the stomach, they may now overstimulate. Here we have to be on our guard against inflammation as we run a great risk of such occurring. But in all severe diseases like the cholera, giving such a short interval to treat them, severe measures must be taken, for if not, the disease would to a certainty speedily destroy were some such remedies not put in requisition. It is certainly therefore much better that we should attempt to save the patient's life, at the *risk of a probable occurrence*, than that he should become a certain martyr to the disease.

TURPENTINE.—The action which it induces being in a great measure stimulating, and as it is found to pass through the alimentary canal unchanged, it seems to be a most important medicine for cholera, provided the stomach can bear its administration. I would say that it is a good stimulant, and has a particular warming effect on the intestines, independent of its purgative properties ; it therefore seems particularly well adapted for all the less severe forms of the epidemic, and may be advantageously joined to castor oil with gum mucilage. In this way it will operate mildly, and effectually. We ought to take particular care, in a disease of the nature of cholera that we do not give medicines which are apt to nauseate, or induce that state approaching to vomit-

ing. As has been before stated whatever tends to the depression of the animal and vital powers, will to the same extent prove highly injurious. There is perhaps none of the terebinthinate medicines or mixtures, but what are liable to do this even to people in health, where the stomach is much less irritable than we find to be the case in any cholera attack. Turpentine however is a medicine of fine powers, when we can venture on it, without the dread of its doing as stated. As it passes through the alimentary canal it will keep up, by its stimulating properties, the action of the intestines, and consequently the nervous power. Two or three drachms will therefore be of great use ; and more than this at once seems useless. It ought to be given in repeated doses with castor oil during the more mild forms, if we depend solely on it for its stimulating and warming powers, this of course according to the duration of its action, a drachm dose therefore may be most proper in those cases that are likely to prove troublesome, and this repeated according to circumstances. Care must be taken that there is not too much thrown into the system in this manner, perhaps we should not exceed much above an ounce in the body at once. I do not mean to tie the hands of any man in the treatment, but let us look to the state of re-action, and see if there would not be a probability of having inflammation induced either in the stomach or bowels from a too plentiful exhibition of turpentine, which we will find undergoes but little change in this complaint. If we hesitate to administer by the mouth, we can at once and under the majority of instances have recourse to it by enema. This we will find a very proper course to pursue in very many cases, and when one is ejected, or after each stool, we can throw up another. We may give to the extent of half an ounce in the ene-

ma, taking care that whatever is added, the whole does not exceed more than two ounces, as stimulants are less likely to be thrown off when in small proportions than when the menstruum is large.

CANTHARIDES. — As a blister, has a constitutional and local operation. They act as anti-spasmodics, and are employed with the intention of relieving the spasmodic affections of the alimentary canal, and other parts of the body, as well as to keep alive the nervous and sanguiferous systems. They have met with little encouragement from most, especially when employed at the commencement of the attack. They are used frequently when the vomiting has in a great measure subsided, or to avert pain in the region of the stomach, or indeed in any other part, and with decided advantage. This is the period at which most practitioners of the present day have recourse to them in the treatment of cholera. It has been urged, that if they are employed early in the attack, they rather tend to increase than allay the existing irritability. I here confine my attention entirely to their use in cholera, and am afraid that their general utility has, been most egregiously overlooked or miscalculated, and that we had been but too apt to ascribe to them what would otherwise have undoubtedly occurred. I should not for a moment hesitate to avail myself of such powers, the very moment the disease has made a determined inroad on the system, rather than adopt the more paltry device of keeping them as a corps of reserve to *aid* in the defeat, when we may, in very many instances, find the body so much oppressed as not to be succoured by any plan of procedure. I would therefore use them not only as a matter of precaution, but of what may be considered imperative necessity, and these placed not only over the region of the sto-

mach, but more immediately near the origin of the nervous source, as to some portion over the spine, or behind the head or nape of the neck; great benefit may be expected from such a mode, and this may at times be witnessed in tetanic affections. We should be the more particularly inclined to do this, from the knowledge of the fact, that they are hours before they come into active operation, and produce their full effect. During the time a blister would take to act, the patient might be totally exhausted from the severity of the symptoms, or at all events the animal and vital powers so much impaired, that little benefit could be derived from their late application; we know well that in the more severe forms of Cholera we cannot get them to raise a blister at all. Therefore, under all circumstances, we should have recourse to them early, and should any of the more aggravated symptoms occur, either as arising from the disease, or the remedy, such can surely be subdued by other powers. That a blister should not act properly, when employed at a late period, in the more severe cases of the epidemic, need not astonish us, if we only take into consideration, what has already been so fully detailed in other parts of this essay, as to the almost total absence of nervous power from the surface, and the more immediate parts; now we can easily perceive the reason why a blister or vesicle should not take place, for all the vessels of the skin are so deranged and torpid that there is not any *natural* action in being. Cantharides, when employed at a late period, will frequently produce a reddened state of the surface, the same as it would do on semi-animate matter, but further than this we cannot expect it to proceed. A vesicle may be produced in epileptic cases, or in paralysis, under certain circumstances; hence some might ima-

gine that this in Cholera was not owing to a deprivation of the nervous power. What does this amount to—nothing—in such cases I ask is the whole nervous power overwhelmed, certainly not. There is no cessation, or all but total abolition of this, in these instances, and we may be the more inclined to admit the reasoning when it is considered that there are two sets of nerves—one for *sensation*, and the other for *motion*, and that each may take on the action of the other in this instance. The one set may be injured, and not the other, or both, according to the extent of the injury, may have their actions suspended; under this last state, we will find that a blister will not operate fully, or if it does this will be after a very long application, and then we may have but little serum as the product, nay the parts on which the cantharides have acted, will be very long in healing. In epilepsy the surface is never so torpid as to be deprived of all its powers, accordingly we will find that a blister acts according to existing circumstance. In Cholera, under the form supposed, we may expect a blister to operate, as it would do in cases of sudden death from other causes, for here we find that a blister reddens the surface in proportion to the strength of the conservative power; at all events nitric acid would do so, if applied the moment the person had ceased to breathe. In palsy, or epilepsy, there is not only a continuance of action from other sources, impaired as it may be, but we know also that every part of the body is so linked together, that each supplies or is dependent on the other in some degree, as well as that there is not a cessation of action in these cases, as takes place in Cholera gravidior, or in the cases of death from lightning, in which the *whole* nervous power of the body seems to be *at one and the same time* under the influence of the

operating cause. We cannot therefore expect the full operation of a blister, from which much, very much advantage is to be gained, if not employed at the very onset of the disease. In cases of less intensity we may expect them to operate more quickly and fully, it may even be added, according to the quantity of serum in the blistered part, so much the more chance of safety to our patient. The system seems to be actually too busily employed, in the more severe forms of the disease, to bestow much of its attention to this otherwise insignificant remedy, when used at a late period. The intensity of the other symptoms keeps it full of business, and it consequently cannot lend a helping hand in accomplishing the effective operation of a blister. Many may say that this is a vague and loose method of expressing our ideas of some diseases, but it is no less true and may, for aught I know, be as conclusive as any other phraseology. By using these excellent remedies above stated is the manner in which we may expect any permanent good to be obtained, when employed at the very formation of the attack, since they tend to keep in action the powers of the sanguiferous system as well as those on which this so much depends.

NITRIC ACID.—Has been used as a substitute for blisters, and with much advantage at times. It must not be carelessly applied, either in too great quantity, or including too much of the surface ; for we may find that, on the patient's recovery, great and serious inconvenience had now occurred. Thus, from mis-application, we bring discredit upon the remedy, and not a little upon ourselves. The sores produced are sometimes troublesome to manage, and when they do heal leave unseemly cicatrices thereby causing some inconvenience in after life. By the proper application of nitric acid,

especially when we are too late for blisters, we may obtain very great advantages, as it acts at once, by which we gain time,—a point of no mean importance in the treatment. In the cholera, in the primary stages, we have not to wait for the previous subduction of an inflammation, as this only exists in the minds of those who entertain such ideas concerning the epidemic. I have shewn that such will not occur, until re-action has taken place, when we would find that our external irritants might do some good, in preventing this from assuming that serious character which it otherwise might do. As to their calling such into greater activity, even after re-action has taken place, I have my doubts, for it is imagined that, under all circumstances of severe cholera, the powers of the body are too much impaired to take on severe inflammatory action, even when the stage of re-action is present; this depends, however, entirely on the innate strength of the patient. Besides if, even during the early application of nitric acid, or other skin tormentors, there be a superabundance of sanguiferous action, it is surely much better to be obliged to curb this, than treat a case of great debility. Can our blisters under all, or any of these circumstances excite more disturbance than that caused by the continuance of the disease, which it is our object to restrain from proceeding to such extremities. Even granting, for the sake of argument, that the case were of an inflammatory character, and that it happened to be checked by such means, we certainly should have much less to dread from its action in this way, than from the continuance of the disease. It is always much better to have patients with constitutions of a high and unruly nature to manage, than those under reversed circumstances. It will therefore I again say be a very pro-

per plan, on the first application of the patient, either to have recourse to blisters, or the nitric acid, according to the symptoms or the duration of the attack. The proper application of the acid is deferred until we come to consider the various properties of the mineral acids.

EPISPARTICS.—Are other remedies which we can employ for the relief of symptoms. It may be observed that their operation is less permanent than that of the two former powers. For this purpose we may use pure liquid ammonia, turpentine, boiling water and some others; the two former to be applied hot, and upon flannel, according to the extent of surface wished to be operated on. All the remedies of this class, may be used in those cases of less severity. They produce, in a very short time, considerable effect on the skin, and general system, but for a further explanation of their general utility I refer to what is stated in the essay on dysentery. It may be observed that by rubbing the skin for some time with turpentine, previous to the application of our blisters, we will ensure a more speedy and full operation of them. As to mustard sinapisms, it may be stated that they are extremely serviceable in most cases. This article may be heightened greatly in its pungency by a combination with other articles, such as turpentine, cayenne pepper, some of the oils, the powder of peppers, &c. It should be made with hot vinegar, even that of the capsicum in some instances, would be found of utility, when applied in this manner we have a more speedy operation than when made in the common way. I would be inclined, according to the severity of the symptoms, to apply them round the ancles and feet, or to the palms of the hands, so as to try and keep up an action, at the extremity of the nervous system; by drawing upon it in this quarter we must have all above

stimulated. In this way, it is thought, we would have that benefit which mustard sinapisms are so well calculated at times to fulfil. In those, in whom we do not wish to raise the cuticle, they may be a most useful set of auxiliaries, and we can apply them over the region of the stomach, or the breast, or other parts. Thus, it may be found that relief is given, in the less severe forms of the disease, from the spasmodic actions, besides keeping up in some degree the action of the surface. If there be any who is unwilling to have recourse to blisters at the very first, then he can surely have little hesitation in having recourse to sinapisms, which will pave the way for the more speedy operation of the other. It may be asked will not these measures exhaust the powers of the system more effectually than leaving the disease to run its own course? To this it may be answered, that by keeping up the action of the nervous system in this manner, we only prevent a torpid state of it which would in all probability occur. What is our best practice in cases of poisoning from opium, in which there exists a torpid state of the system, after the noxious ingredient has been thrown out? Do we not, by every means in our power, try to rouse the nervous action and keep it awake by causing our patient to walk about, and not allow him to *sleep*. In both instances then, we know that if such occurred we would be extremely apt to lose the patient, and I conceive that in cholera no better means for gaining such a desirable object can be accomplished than by the application of these remedies, and this especially at the time recommended.

It now remains that a few general remarks should be made on the use, and abuse of stimulants, for effecting the various indications in the treatment. It is thought that the best stimulants we can employ, in very many

cases, are those of the volatile nature, since they act speedily, and as powerfully as any of the others. Their doses can be proportioned according to the various intentions required, or the effects produced; here we have the true tact and judgment of a practitioner shewn, since their proper administration is one of the nicest points that we meet with in the treatment of many complaints, besides this one. It requires in some cases a strict application of the mental powers to determine under what circumstances we are to refrain, and when such should be administered. The volatile stimulants, in the most minute doses, will not offend the stomach at all events from their bulk, a point, by the bye, of no slight moment as regards the treatment of cholera. Their action being once set a-going, can be kept up at proper intervals, which is the point of the true application of principles to practice. For this purpose the carbonate of ammonia, in pills of from one to five grains, can be used, and may be most advantageously joined to assafoetida in an equal proportion. These may be regarded as preferable to the liquor ammoniæ, since they are less likely to excite nausea, besides their action is slow and progressive. The liquor stimulates at once, and is perhaps too diffusible, the effects are soon over, as compared with the pills which keep up a more permanent and powerful action. The liquor I think is only judiciously used in those cases which shew an evident tendency to a sudden depression of the powers of the system, and which threaten speedy dissolution. I have said that stimuli of this class are less likely to offend from bulk than those of the other class, this is a point of no mean importance, especially when we have an irritable stomach to manage. If the opposite are used, would they not be apt to excite nausea, and even vomiting, at the very time

the system begins to rally, and, from this cause alone, the weakened body would be again overpowered, thus extinguishing the remaining vital spark; or the patient would be thrown back into that lethargic state, from which all the medicines in the pharmacopeias could not recover him. If this is correct, large and repeated doses of brandy and water must be prejudicial, or any of the other stimuli, in which bulk must be used, ere we can have their full operation. The indiscriminate use of brandy in cholera may be considered to be highly injurious, and ought to be strongly reprobated; patients have been known to take very considerable quantities of this. Now supposing, under these circumstances, that the system begins to rally, would not the very quantity of brandy destroy, or tend to put an end to the remaining chance the patient has of his life. What are the effects that a pint or more would have on the stomach of most men otherwise in health? Have we not all of us either heard or seen cases of sudden death, as the result of quickly drinking such a quantity as now stated, many very many cases have I, as well as others met with, in which the most injurious consequences ensued from the sudden swallowing of large portions of spirits. In cholera it may be said that our patient, even when taking it in the dose of an ounce or so at a time, will come in the end to have a considerable proportion on his stomach. This, as a matter of course, from the torpid state of the system, will not have undergone almost any alteration;—will it not be extremely apt therefore to act on the stomach and bowels the moment re-action takes place, and thus again overpower the very action that is now in being? It may be answered that there is a vast difference in the powers of the body in withstanding extraordinary doses of different medicines, and stimulants among the rest, betwixt disease and

health, or even from habituation; I know this and admit it to a full share of consideration, even, however, disproportionate as this may be between the opposite states of the body, yet I am persuaded that the system, in the majority of cholera cases, is incapable of overcoming or throwing off the effects so produced from the over dose. We must recollect that the epidemic acts on the nervous system in the manner of certain poisons, and that this forms the grand difference between it and many other diseases in which stimulants to a large amount are daily demanded. In this epidemic, the body has suffered in a comparatively short time, the powers of life weakened as they are, must now, be but ill able to counteract that which in health is often too much for them to manage. In this disease we must also recollect that re-action being once begun, the least untoward event may turn the balance either for or against our patient's life. It is not wished by any means to condemn this otherwise good remedy, but it is the abuse of it that is brought in question, as the administration of from a pint, to a pint and half, within the short space of a very few hours. I would certainly therefore prefer the volatile class of stimulants, and these generally in the solid form, unless where we are desirous of exciting an action in the body at once, when the liquid can be employed; after this is accomplished, the former will then serve to maintain it. By this means, while the pills are dissolving, there is always a little stimulus in one corner of the body which must prove of much more benefit than when such are given in their liquid state, these in their action prove of but short duration, for they only produce a sort of blaze and are gone. It is surely much better, under all circumstances, to have a little fire which we can keep in being, to warm our patients in such a cold complaint, than a *blaze*

of short duration the effects of which being soon over or exhausted, they are left to perish by the depressing cause which robs the system of its animal heat. Such then may serve to guide us in the proper adaptation of "means to ends."

ENEMAS.—These remedies, when judiciously employed, are particularly well calculated for fulfilling some very important indications in the treatment. This is what might a priori have been expected, considering the sympathy which exists between every part of the body, and especially throughout the whole tract of the alimentary canal, this in particular proceeding from the very large supply of nerves with which these structures are furnished. These remedies then will have very beneficial effects in lessening the general irritation about the rectum, as well as from their warming the bowels, and fulfilling some other useful points of much importance. For this purpose, in the more severe cases, I would certainly give the preference to those which have a tendency to keep up the nervous power, not only of the parts but of the general system. Such then we will find oil of turpentine, with an addition of tincture of opium, or any other sedative, and some mucilage, in all not amounting to more than an ounce, or an ounce and a half, so that it may be the more easily retained. We can add other adjuvants to this, or even change the form, according to the particular indication. The turpentine may be proportioned, according to the severity of the symptoms, from two to six drachms, if rejected when thrown in they are again to be repeated as soon as circumstances will permit, and generally after every dejection, if such be not of too frequent occurrence, so that we can thus keep up a constant stimulus in this end of the alimentary canal. These, however, as usually

administered and allowed to fulfil the several indications stated, are but a trifling adjunct to us in the treatment of the more aggravated cases, and seem to fall far short of what they are calculated to accomplish. If correct in my views of the disease, and if the principles are accurately stated, it is imagined that we ought to have recourse to some styptic or astringent ones. Here I allude principally to the stopping the drain of *fluid white blood*, which is now every where poured out along the canal. Would not therefore a solution of alum, or a decoction of barks, or a solution of salt in water, or water, acidulated with some of the mineral acids, be more usefully employed, or even the other forms could be acidified. We would, even as they are generally used at present, obtain many of the same beneficial aids; when warm, they would tend to allay the irritation of the bowels, and heat them, and if tincture of opium be deemed an indispensable article, they would be thus put in possession of powerful anodyne qualities. When thrown up the rectum, they would constrict the mouths of those vessels giving out the fluids. This we see, although of some benefit, would be but of partial use, in so far as regards the whole surface of the alimentary canal, and therefore our grand point would seem to be to have these injections thrown up as far as possible, and in considerable quantity, thus they would come in contact with a very large proportion of the alimentary canal. Under this idea it is thought that little harm could be done by throwing them beyond the valve of the colon, and it is imagined that there are few cases to be met with in this disease, in which this could not be easily accomplished, by a well directed application from Jukes's pump. This could be as effectually done as in cases of volvulus, where the same mode of practice is at times pursued, only with a different, intention, as

well as in some other cases of disease. I think then that the throwing into the intestines considerable quantities of these warm styptic injections, would be attended with the most decided benefit, the longer they were retained, so much the more certain would we be of accomplishing the desirable objects of treatment. It may be answered that this method would be impracticable from the continued vomiting and purging or that from the stimulus of bulk, it would be exceedingly apt to rouse the dormant pains. I grant that there may be some risk of this, but if we consider that, in the majority of these cases, these very cramps, vomitings and purgings take place from the consequent debility of the system presenting us with the clonic species of spasm, that this very mode of procedure would tend to put an immediate termination to these symptoms, when tone was added to the system. That this method is pretty well calculated for fulfilling the indication in view, few persons, it is supposed will venture to deny. Besides, in the ordinary methods of treatment, as soon as the severe vomiting and purging of the white stools are allayed, we know well that our patient runs a great risk, if something very effectual, and this speedily, be not done to rouse the dormant powers. It is then, when the white fluid drain is established, that I would have recourse to this plan, as well as stimulants by the mouth, in order to have re-action if possible established. Let us not protract too long, lest we should lose our patients from delay, as has been alleged to be the cause of general failure with the Cæsarean operation. I am well aware that patients have died of cholera, who have never had any vomiting or purging, or at least so partially so as to pass unnoticed in the general enumeration. In such cases the system has received a death blow from the very first,

from which it could not recover, if some very effectual measures were not taken for its relief, since we will find that, although there is neither vomiting or purging, the bowels are filling with the white fluid material which we may observe to be the case on inspection, and that it is only from the severe torpor of the body that the symptoms of the disease are not more characteristically marked. In such cases also this is one of the most potent means we can adopt, since the stomach in general is so dead to all impressions from medicine, that they cannot be taken into the body, our patients under such circumstances then must die if something effectual be not done. I leave the subject of enemas with the distinct impression that very great advantages are to be derived from them, under any form of the disease, and to the extent that enema may be deemed advisable. When the purging has been subdued, there sometimes exists considerable strangury and tenesmus; we may find that a suppository of opium and soft soap is well calculated for allaying these. I refer, however, to what is said on this subject in the treatment of dysentery.

WARM BATH.—This remedy, according to many accounts, proves a useful and powerful auxiliary to that of the lancet, and, as they say, is well calculated for fulfilling several other most important indications in the treatment of Cholera. It has been stated that it is a powerful stimulant, and acts by restoring the animal heat, by the subduction of the cramps, the vomiting and purging, and allaying the general irritability, bringing the blood to the surface and that it is an anti-spasmodic also, to which I add that, in certain states of the body, it will certainly prove a most decided sedative. In India, and elsewhere, it is and has been used as high as one hundred and ten, and even upwards, how far successfully

will shortly fall to be considered. Heat, says Cullen, rarifies the blood, more than it relaxes the solids, which had been before contracted by the cold of winter. This may, in some measure, account for the *filling up* as it were of our patient's surface, when placed in the hot bath in this cold disease; for we know that, in most cases of cholera when fully formed, all the parts of the surface are more or less shrunk. Dr. Jukes observes, "there is nothing more immediately stimulating to the arterial system than heat, and hence the hot bath is strongly indicated, and my own practice substantiates the truth of the theory." Had the author, from whom this passage is introduced, informed us under what circumstances we could have recourse to it, or if, in all forms and varieties of the disease, it would prove so, then we would have been enabled to push the remedy in such instances with some good chance of benefit. There are few, if any, who have sufficiently examined the merits of this mode of proceeding, if they have, it must be confessed that points of the greatest importance have certainly been overlooked, and such as *we* must bear in mind. There is a medium to be pursued in having recourse to the remedy, for if heat under certain forms or conditions of the system strongly stimulates, it will also under other circumstances *powerfully depress*, "the utmost therefore, that can be said of the hot bath is, that it is fortunate when it proves a relief to the cramps without doing harm. Mr. Chalmers gives five very sensible objections to the use of the hot bath; that it appears to increase the fatal debility and relaxation of the skin, and cold sweat; that the patient frequently sinks on removal from the bath; that the erect position, or in fact the necessary locomotion, however trifling, frequently occasions syncope, from which the patient

“ never recovers ; and that to use his own words most
 “ epidemic patients have an unconquerable aversion to
 “ the warm bath and I have known many of them, *who*
 “ *were apparently comatose at the time*, roar out with
 “ horror at the apprehension of being immersed in it ;—
 “ The fact is that many patients who were strong and
 “ vigorous, and writhing in convulsive cramps, when
 “ immersed in the bath, suffer a sort of syncope of bodi-
 “ ly powers, say they are dying and do die exhausted
 “ when they are taken out.” The same likewise occurs
 in tetanus, where, from the accounts of some authors, pa-
 tients have died as soon as they had been taken out, al-
 though the temperature in these cases was not so high
 as that used for Cholera. Now let me ask the reason
 why all these things should occur ; and, ere the conclusion
 of this article, it shall be plainly shewn why such should
 take place. In the first place we must take into account
 the present temperature of the patient’s surface ; and, al-
 though not actually indicated by the thermometer, yet
 his sensations in this respect are enough for our guid-
 ance, or those communicated to our feeling the surface of
 the patient. Who, for example, would think of plunging
 a man whose skin was cold to the feel, or when the ther-
 mometer indicated a considerable diminution of animal
 heat, into a hot bath much above one hundred degrees.
 The reason why no sensible man would, under such cir-
 cumstances, do so, is because the shock communicated
 to the system is more than our patient can bear ; it
 is just as bad, and proves as injurious as suddenly heat-
 ing a frost bitten part, would we not find that the part
 so treated would inevitably gangrene—Even suppose a
 healthy man in England, in the winter time, exposed
 naked in a room, only for a short time, and then plunged
 into a hot bath of perhaps only ninety, or a little upwards,

what effect would be likely to ensue? I expect that he would not remain in it for his own satisfaction, for an instant, as it would to his sensations feel many degrees hotter than it really was. Now how much more detrimental must this mode of procedure be to a patient who is so much reduced by this disease, even although he may complain of much heat, and the coldness of the skin is particularly manifested in the collapse or cold stage. In such cases the rallying powers of the body, should not be attempted to be brought into operation in this manner, for if so it would only now operate as an all-powerful and overwhelming cause. This plan therefore we see, when used as a stimulus by many, will act in most instances by robbing the body of those very powers upon which it depends for its very existence. The hot bath under such circumstances of a cold state of the skin, and in particular in the more severe forms of Cholera, and in the latter stages of it, will be found strongly and powerfully to oppress those powers already fast sinking, and, in this way place our patient beyond all chance of recovery. How frequently has it been stated that, in epidemic Cholera, all the powers of life are woefully oppressed. If any such remedy be thought of it should certainly be near to the temperature of the body at the time, the heat of the bath should therefore in all cases be modified accordingly. But what could we gain by such proceedings even under this state, would not this very form prove another robber to it, employed for the distinct purpose of abstracting the remaining lingering portion of the animal heat. What state of the system may we expect to be induced by this unnecessary interference on our part? I say that we have the shock of diminution produced, which is that state of debility rapidly induced upon the animal and vital

powers, and that there consequently must follow a rapid loss of excitement. When this takes place, under other states of the body than the present, the pulse is fluttering, either rapid or imperceptible, and there is little or no stertorous breathing. Such then may be styled a shock of failure, and will be found to be present in Cholera, and occurring from the use of the hot bath. Will our stimulants, under this state of things, prevent the patient from sinking further; in very many cases they will not, but they are our only chance. Would the better plan, under this idea, not be to wrap our patient's legs, and the other parts of his body in blankets, so as to confine the heat which is escaping so rapidly from the system; these may and ought to be employed only a *little* warmer than the present heat of the body.

We see then that the proper employment of artificial heat is a most important point, requiring much judgment and attention. It has been mentioned here, as well as elsewhere, that there are certain states of the system in which artificial heat acts as a powerful stimulant, this will be when there is no great overpowering cause affecting the whole nervous system. The less this is interfered with, or injured, the greater the stimulus, and beneficial effects of the remedy. It has also been shewn that the operating cause of Cholera greatly deranges the sanguiferous system, as well as the nervous, circumstances of great importance to be borne in mind; any remedy therefore which tends to destroy the equilibrium of either, as the hot bath does, will operate forcibly in the reduction of the animal temperature. How far then will artificial heat assist in restoring that which is lost? and here it may be again remarked that heat has either a sedative or stimulating property, according to the state of the body. Where the

nervous power has not been materially interfered with, even although the body be cold, and artificial heat be employed, we rouse the whole system, or part, and consequently have its stimulating operation. But in Cholera, we have an opposite condition of the body, proceeding from a severe depression of the whole of the nervous power ; the use of such a remedy now we would find only to sink it faster ; this then may be taken as the true diagnostic mark for our guidance. Let us take a patient, after long confinement from any severe bodily affliction, and put him into a hot bath of a high temperature, the consequences I apprehend would be an almost instantaneous sinking, or syncope, from which he might with difficulty be recovered ; all this of course proceeds from an exhausted state of his sensorial powers. Such an exhaustion of these powers is speedily induced in some nervous disorders, six hours' attack of cholera will do more in this way, than perhaps six months' duration of another and opposite complaint could accomplish. Many men, in ordinary health, cannot bear for any length of time the oppressive action of a hot bath, but, as examples of this must be familiar to every medical man, it is unnecessary to enlarge on the subject. Suffice it to say, that I strongly reprobate the heat of a hot bath from one hundred to one hundred and twenty, and most stoutly do I object to the principle of *steaming* or parboiling our patients, by the introduction of a pipe from a steam apparatus between the blankets, and next to the body of the *miserable* ;—inevitable death it is thought must be the consequence. It is believed that we have enough to contend against in the treatment of this malady, to prevent us from wasting our time and acquirements by applying to the forcible laws of mechanics for efficient aid. Steam, no doubt, has conferred great benefits on mankind, but it has also

not unfrequently been the cause of the loss of very many lives. Since we have steam baths it is by no means unreasonable, many may suppose, to have recourse to them in cholera, with the view of stimulating the system, and relieving untoward symptoms; thus they would combat the malady on as extended views, as could ever be put in requisition in the management of any distemper—curing Cholera by steam! Can any one answer why patients have fainted when placed in a hot bath, in other diseases than Cholera, their answer must be mine—from the overpowering operation induced on the nervous system. The powers of life are but little able to bear up against such an overwhelming remedy, especially when long continued. A judicious application of this then is not only proper, but, if pushed beyond a certain point, it will to a certainty kill the very patients we are endeavouring to save. The only circumstances under which we can with any propriety have recourse to this in cholera are those instances in which the nervous power is *strong*, and in too active operation, with the view of subduing the excitement and irritation of the body; be it recollected, that in no case, in which the cold stage is present, ought we to have recourse to it. The intention of giving heat to the body can be accomplished in some other way than by having recourse to the bath,—as by dry heat. Each practitioner can use this as his judgment sees necessary. Some may choose bottles of hot water, others tin cases, and apply these round the extremities; others again may prefer it as the heat radiates from a spirit lamp, kept burning under the cane bottomed sofa; charcoal should be avoided, for this purpose, on account of the noxious fumes given out. Dry heat, cautiously and gradually employed, seems much better for gaining our ends, than the troublesome

one of the hot bath; in applying any sort of artificial heat we must keep carefully in mind the dangers that are likely to arise from its peculiar *modus operandi* in cholera. If, however, our patient be in the more early period of the attack rolling or tossing greatly in bed, and there appears native strength, and the general character of the epidemic is not malignant, then we may use the bath, but it ought only to be near the temperature of the person, observing also that he is not allowed to remain too long in it, otherwise we will have too much of its sedative operation, and that very torpor induced which we ought cautiously to guard against. There are some who have advised and practiced blood-letting in the bath, this is certainly a method by which we can obtain in many instances more blood from the body; but as to the general utility of the procedure, I refer to what has been said as to the proper employment of this remedy; be it again stated that they are both powerful sedative remedies, and may answer well in some instances of the less severe cases; they must be employed however at the moment of the formation of the attack.

Thus then is completed the investigation of some of the most important general remedies used in the treatment of the more severe forms of cholera. Previous to closing the enquiry, and before considering the *modus operandi* of other medicines, it may be proper here to notice that this epidemic seems to present as many forms and varieties as are met with amongst a host of dysenteric cases,—each particular case is modified by peculiarity of constitution, age, sex, the nature of the reigning disease, with a multiplicity of other causes; so that each individual case requires some modification of treatment perhaps even the reverse of that so suitable to the one that lies in the adjoining bed. By bearing this in mind the imprac-

ticability, or more properly, impossibility of giving a short summary of those remedies and what I should consider the preferable mode of procedure will at once appear evident. There is one thing it is believed accomplished, a good table has been furnished, from which every medico can suit his own intentions of treatment, be it also stated that these are not distorted, or made-up ideas with the view of supporting theory, but the plain matter of fact opinions, upon their action, and what we may be led to expect from their administration. In the search after truth I have had a laborious duty to perform, but I have followed closely that path to the best of my knowledge, and at no time, either from personal animosity, or the love of finding fault, have I deviated one single inch from it. There are other important medicines capable of accomplishing much good in the treatment, for be it recollected we are only at the *stage of re-action* as yet ; we may now proceed on the enquiry by taking into account what benefit will be derived from the administration of the mineral acids.

MINERAL ACIDS.—Their exhibition in cholera is a different plan of procedure from that usually had recourse to, at the same time the general principles hitherto advocated are kept in view. These acids are stimulants and tonics, as well as powerful astringents. Our grand aim seems to be to strengthen the nervous function, and secondly to check the inordinate drain of *white blood*, if this has been now established, if not, other measures can be taken in order to prevent it. Many remedies have already been pointed out as capable of effecting this, under certain states of the body. But we are yet unacquainted with medicines of that power for fulfilling this most important of all indications, when such a drain has actually occurred. The mineral acids appear to me to

be well calculated for accomplishing many useful indications in the treatment,—the best of them appears to be the nitrous and nitric. These acids may be regarded as chiefly valuable from their astringent and anodyne quality; I call those medicines anodyne which have a tendency to allay vomiting and purging, even although this may proceed from their astringent, or stimulant properties. In consonance with this view, they are certainly entitled to the appellation, for we know that the nitrous, in the more severe cases of dysentery—particularly those occasionally met with in India—often at once puts a stop to the severe vomiting and purging. Here there are cases to be met with, where after a very short continuance of the disease, portions of the intestines may be seen passing off by the anus. There is no mistake here, for I do not mean to confound this with the albuminous membrane-looking substance thrown off in croup, or even at times met with in dysentery. But I say that there are such cases met with, in which the disease speedily runs its course, and, from the high state of existing inflammation, the membrane is actually thrown off. In such severe cases, a dose or two of the nitrous acid, which seems far better adapted for this purpose than the nitric, being administered, in a convenient menstruum, will, to a certainty, have a most wonderful effect in checking the purging. This being the case, why should we not have recourse to their use in cholera? These acids would not only, in some measure, tend to keep up the nervous energy, from their general stimulant properties, but also, from their astringent qualities, have a powerful action over the whole of the exhalants of the intestinal tube; and thus act in checking the purging by their constringent powers; this may put a period to the existence of that most ruinous discharge, either as

existing in the stomach or elsewhere ; here they will be more particularly called into action. If the vomiting be checked by these means, or any other judged advisable, we will then have a little time to operate on the system generally, by the other remedies capable of fulfilling the several indications required. It may be observed, as to the acids of this class, that they have been used, and with considerable success, some years ago by a few practitioners in India, in the more malignant cases of cholera ; this however, refers to their external application, by which means, as formerly noticed under the article Cantharides, we gain more time than by any other practice that we can at present suggest. The nitric acid used for the purposes of a blister, when this last is not had recourse to in time, will be found to be a point of practice not to be disregarded, as the action thereby excited must tend to keep alive the decreasing energies of the system. For this purpose, we take two parts nitric acid, and one of water ; with this mixture, the parts to be acted on are to be rubbed, with a feather or piece of flannel ; wherever the parts so treated pain too much, the acid is to be neutralised with a solution of the salts of tartar. The cuticle comes peeling off, and leaves the cutis raw, to which we can then apply a blister, or mustard sinapism, which will keep up the irritation of the surface now commenced. Some, as was formerly noticed, may be inclined to say that such a mode of procedure would tend to exhaust the nervous power,—no such thing, for if by such means the counter irritation is effectually established and maintained, the nervous power, which would otherwise have become torpid, will have enough to *think about*, and be thus prevented from falling asleep, and, as elsewhere observed, as to the injurious effects of opium, so in this disease we must keep these energies of the sys-

tem employed. The result of this mode of procedure is well known, but it may not be amiss to state it. Mr. Powel treated forty one cases in this way, losing only six of them, and of nine others treated in a similar manner, by another gentleman, there was only one death. Now comes the important point to be noticed, these patients were all admitted in such a state that blood-letting was totally out of the question,—even when attempted not a drop would flow. Here then we have one grand point accomplished, by the timely and judicious use of acids. Many condemn the practice, and for no other ostensible reason than that such doses do not prove beneficial in *all* cases. Now I have shewn that Cholera is most versatile in its character, requiring for its subduction a variety of powers according as the state of the patient and symptoms for the time being are indicated. It is therefore foolish in the extreme, nay, childish to condemn a practice of so much general utility, merely because these medicines have not proved *specifics*; who is there that could expect powers of this sort from any remedy we are acquainted with, he must be a *rara avis*, if any where in existence. It is believed that the genus is long ago out of the sphere of doing any harm in this world.

For internal exhibition, these acids should be given compatible with the safety of the patient, they may be joined to colombo, or cascarilla infusion, or any other pleasant tonic remedy. The muriatic acid must also prove highly serviceable; upon this principle, we can easily have recourse to the muriate of soda, either given in such quantities as not to offend the stomach by exciting nausea, or a tendency to vomiting, as before remarked, a point of great moment to be avoided in the treatment. Their primary and great operation would be on the sto-

mach, and, through this medium, on the general system, and as they descended along the alimentary canal, they would communicate their beneficial effects to all parts with which they came in contact—thus the astringent operation would be extended to the mouths of the exhalants. The mouth or teeth could be easily defended by having the dose drawn through a quill, or any other convenient method, I care but little which of these acids, be had recourse to, if the premises are well founded, they will all be found useful. For internal administration, as also for enemas, as formerly noticed, the nitrous should be preferred, if that is not at hand the nitric, and the last but not the least effectual the muriatic, in such doses compatible with the safety of any thing being caused like a local operation on the parts themselves. When we want to administer purgatives the following may be found a good combination, equal parts of the sulphate of magnesia and boiling water, say seven ounces and one ounce by measure of the dilute sulphuric acid, a table spoonful of this will be found of some advantage in the regulating of the bowels in the more mild forms of the attack, this may be given morning and evening, provided it operates moderately. It is presumed that a few drops of any of these acids, after every dose of calomel and quinine, might act well, or even a solution of common salt, such would assist greatly the action of the stomach. Upon the principles of Dr. Thomson's theory of digestion I am inclined to believe that the muriate of soda was first advised as a useful auxiliary in the treatment of cholera, by improving the powers of the stomach, it is imagined that in this way, much good would be done. As to muriatic acid, or the muriate of soda, forming a muriate of mercury in the stomach, I think none need be afraid of this, for there is not a proper quantity of heat

in the body at any time, so as to have such a thing accomplished. Seamen, it has been observed, are less liable to cholera than other people, from their eating so much salt provisions, this, however, is more fanciful than otherwise. If they are at all exempt from the ravages of this most lamentable disease, it is from the fact of their being generally less exposed to the operation of the exciting cause; for we do find that, when so, they are equally obnoxious to the disease as any other class of men, and when attacked they suffer most severely, and this especially from the confined state of the atmosphere, which necessarily at times exists between decks, in addition to the other causes to which they are so much exposed. It has been observed in the II. Vol. of the Edinburgh Journal, that, "nitric acid is tonic without over-stimulating. It is a grateful and cooling beverage to the parched mouth and burning body; it is therefore, febrifuge; it is antiseptic, and in these combines the good qualities chiefly wanted at this period. The best test of its pleasant virtues, is the incessant call made by the sickly patient for the acid drink he got when last in Hospital." As a sort of preventative to epidemic diseases, these acids may be looked on in some degree serviceable, used either as a pediluvium or bath for the whole body. The nitro-muriatic acid bath, or the nitric acid itself in a sufficiency of water, will be found highly serviceable in keeping the action of the skin in proper play. In this manner they have a powerful operation in exciting the extremities of the nerves, which of course is also participated in by the general system. In all cholera cases whatever, I would certainly sponge the surface with a pretty strong solution of this. About two gallons of water, to an ounce of the concentrated nitric acid, can easily be heated, and the body sponged;

by which it is presumed we will do much good. The body, in the more severe forms, may be so treated every hour or so, for the fluids carried off from the surface, will certainly tend to dislodge the remaining particles of the remedy, or its effects will be found to wear off, in this time. After the body is carefully sponged and dried, our patient should be kept as quiet as possible, and not allowed to get up, but have every thing he may require near him. This is not the place to say any thing in respect to the other virtues of these acids, such therefore are passed over, and other remedies now fall under our notice.

PURGATIVES.—Every one is sufficiently acquainted with the effects produced by the administration of these medicines, so that we will not require to dwell at any length on them: it shall be stated in a general manner what may be expected from their administration. Each practitioner has used them for fulfilling various indications in the treatment, according to his peculiar notions of Cholera. Now in all cases, in which the stage of collapse is not likely to take place, they are sometimes usefully employed. Previous to proceeding energetically to work with these powers, a few things must be noticed. Some are in the habit of administering cathartics, through the whole progress of every case, especially after the exhibition of calomel and opium. Calomel, as before noticed, will restore the various secretions more effectually than any thing else. Purgatives are not so well calculated for this purpose, but when in superabundance, they will more likely force such out than contribute to the healthy state of the alimentary canal, especially in the more aggravated forms. Great care is requisite when we employ these remedies, that we select such as are of the gentle and easy operation; be it remembered, this is a

point of no mean importance or to be passed over. Many employ the most powerful and drastic of the class, such as the *oleum tiglii*! in all forms of the epidemic, with what judicious intention I cannot for the soul of me divine, if they were only to reflect, or were capable of the least reflexion, they would certainly say that as there is little or no feculent matter in the alimentary canal, they can expect to derive but little advantage from their administration, since they will not, at least in Cholera, restore the secretions. If such men attempt to defend their practice (and such are not unfrequently known to lay hold of the straw when sinking) by saying that they use them with the idea of stimulating the alimentary canal; it may be answered that it is the subduction of this stimulus we ought to aim at. Besides if it be with the intention of doing so, why do they not select those stimulants, of a less deliterious property for accomplishing that which, in their view of the case, seems the all-important measure to be fulfilled. Let none say that the more warm and drastic purgatives are the preferable in any such case as those of the *mort de chien* species of cholera, nor let them even attempt to defend the practice by the statement that the bowels are torpid, and that the more mild sort of this class would have but little power over them. What do they unconsciously acknowledge, why simply this, that they are willing to call into active operation these deliterious powers of the body, as well as *solicit* the presence of that drain, which has been shewn to be the principal point to be avoided, our object therefore is not to solicit but to avert such a fatal catastrophe. These drastic purgatives therefore would to a certainty have this very power, more particularly if the intestinal tube were alive to their full powers of operation. They ought to be most sedulously avoided as evidently inju-

rious in the highest degree, nay even the saline cathartics so beneficial in other forms of disease, must be laid aside in this, as also all medicines which are likely to nauseate, such as the salts and tartar solution, since the neutral salts are apt to stimulate too much, and, by their operation, call forth a powerful quantity of the circulating fluid. I certainly abhor those *lusty* and *apparently* vigorous practitioners who say, without reflection, and in an instant, or at first sight of a case, oh ! give a couple of ounces of epsom salts, this too in any bowel complaint to be met with in India, no matter the form under which the patient presents himself. The sulphate of magnesia is by far too stimulating in large doses in this disease, (and in small they are of little use,) to be used as a general practice as well as in many other bowel complaints to be met with in India, for it will be found that they do more harm than good, therefore should be entirely laid aside, and indeed they have been so, especially in such large doses by the discriminating Physicians of the Eastern world, and in their place more mild and less stimulating are now in use. The exhibition of the sulphate of magnesia, in almost any form of bowel complaint, particularly in cholera and dysentery, must be had recourse to according to the susceptibility of our patient to be acted on by small or large doses formerly ; for we may find that one or two drachms is enough in some instances, while in others it may require as many ounces. Such then is the diversity of the human constitution, and it is perhaps no where so powerfully shewn as in an intertropical clime.

When the more severe symptoms of cholera have been overcome, I should, from what I have seen of the disease, be inclined to allow my patients to rest for a day or so, at least before having recourse to any purgative what-

ever, or more properly gentle laxatives. This is a good rule for our guidance, and we ought not to hurry the system too forcibly from one extreme to the other. Many are the cases of secondary attacks, nay primary also, of dysentery that I have witnessed, by a too hasty and indiscriminate use of cathartics. After the more severe symptoms have given way, we should rest, as it were, and see what the calomel and quinine which has all this time been administered and is now gaining ground will produce on the system, as we need not be exceedingly anxious, since we well know that the bowels will not be over-stimulated from the presence of bulk, or an over acrid cause. It would be odd indeed if the bowels should not be allowed to remain tranquil after such severe labour, but this depends entirely on circumstances. If the case has not been of long duration or severe, consequently these alimentary secretions may be more extensive, and again by their presence stimulate the intestines,—thus we may have a renewal of many of the symptoms. This is more likely to occur in those cases where the premonitory symptoms have been formerly strongly marked. If therefore it be deemed proper to use them, especially if the calomel does not produce a stool or two, which it will frequently do, then a gentle dose of senna, in decoction of tamarinds, with some powder of ginger, or manna and supertartrate of potass, or when the stomach is irritable we may give rhubarb and calomel made into pills; any of these are to be given in divided doses, and at such intervals as they may soon procure a free stool or two, they will be attended with as little griping as any thing of a purgative nature we can select. It may be observed the saturated solution of salts, with the sulphuric acid, as formerly noticed, in a dose of a table spoonful will be found serviceable. At all times, we

should give some pleasant aromatic along with them, such as rhubarb and carbonate of magnesia, with ginger, or this in peppermint water as a draught. Or we may give a purgative and tonic together, such as colombia or cascarrilla infusion with rhubarb, castor oil, &c. and at all times taking great care that the powers of the system be not too much depressed.

Such then, briefly stated, are the rules for our guidance, particularly in respect of the more distinct cases of cholera. Little has been said as to those forms in which the symptoms are not so severe, or in those in which there only exists at this particular period derangement of the alimentary tube. I cannot do better for the illustration of these points than introduce a most judicious mode of practice pursued by Dr. Kennedy. He observes, " I know no better method of answering these than by
 " the abstracting blood, in reference to the strength and
 " state of the patient for the extent ; by administering
 " castor oil with laudanum, the former a mild purgative
 " to induce a healthy action of the bowels, in place of
 " the inordinate and now diseased secretion : and the
 " latter to assist in allaying the irritation of the stomach
 " and bowels, and to guard against the over-action of
 " the oil ; with a blister applied to the scrobiculis cordis
 " as a counter irritant, to assist the operation of the oil
 " and laudanum, with opium in pills, to allay the spasms,
 " and to check the violence of the purging, after the vomiting has ceased ; and finally exciting but not intoxicating ! or acrid stimulants ! as cordials to support the
 " sinking strength of the patient. The whole of these
 " are requisite in almost every case, at least, to expedite if not to insure the cure." It will be seen that the above views are not entirely in accordance with those advocated, the passage is only quoted with regard

to the purgative mode of practice. “ For the mixture I
 “ mingled of castor oil and honey, each six ounces, tinc-
 “ ture of opium twelve drachms, and camphor mixture
 “ ten ounces and a half.” Might not the opium be safely
 abstracted, and some less injurious sedative added, so
 that we may run less risk of injuring the general system,
 this, however, depends greatly on the nature of the attack,
 as also of the epidemic. It is added that “ the honey is
 “ necessary ; it prevents the oil from passing through
 “ the bowels unchanged, which, when such a spasmodic
 “ action is going on, is of frequent occurrence : further it
 “ makes the draught less nauseous, and its very bulk
 “ acts beneficially giving the stomach a bland substance
 “ to act on.”—“ For the pills I powdered three ounces
 “ of camphor by friction, adding the necessary small
 “ quantity of nitric æther in lieu of common alcohol, then
 “ dissolving two ounces of gum opium in tenacious
 “ mucilage of acacia gum, I had the whole effectually
 “ beaten into a mass and divided into 480 pills, each of
 “ course containing three grains of camphor and two of
 “ opium.

“ The directions were, that the patients as soon as
 “ they were attacked, should be made to drink plentiful-
 “ ly of hot water, which being vomited up, and the
 “ irritation of the stomach for a moment relieved : two
 “ ounces of the mixture were to be administered : if sick-
 “ ness returned a copious draught, or at least a pint of
 “ the warm infusion of the toolsee (*ocimum gratissimum*)
 “ an herb always at hand, as the sacred plant of the
 “ Hindoos, should be given: this infusion was generally
 “ at first vomited up, but the second draught, if it did not
 “ allay the sickness, always came up with less of pain
 “ and spasms. One of the pills was then to be given,
 “ and if vomited up, to be repeated after each vomit.

“ When the stomach was soothed by the pills, and one
 “ ghurry after the last vomit (exactly half an hour) a
 “ second dose of two ounces of the mixture was to be ad-
 “ ministered, and the patient was permitted to quench
 “ his thirst, or allay the burning heat of stomach, by
 “ drinking equal parts of milk and thick rice water *cold* :
 “ after which in ordinary cases the patient would sleep.
 “ If these did not, however, give relief but the vomit-
 “ ing continued, they were directed to apply scalding
 “ water to the *scrobiculis cordis*, so as to raise an in-
 “ stantaneous blister—or as they generally could not
 “ be brought to this rough process, they were to pro-
 “ cure one of their Surgeons and apply the actual cau-
 “ tery to the region of the stomach,—a much rougher
 “ practice certainly, but being in ordinary usage amongst
 “ themselves, they seldom make any violent objection—
 “ after this operation the pills were to be repeated every
 “ ghurry, and as soon as the vomiting ceased, a third
 “ dose of the mixture was to be administered. In the
 “ mean while, the belly and extremities were to be rub-
 “ bed with a liniment formed of two drachms each
 “ of opium and camphor, and half an ounce of wax dis-
 “ solved in a pound of sweet oil. The frictions
 “ were directed to be suited to the feelings of the pati-
 “ ent, and not carried on with a roughness likely to pre-
 “ vent the accession of sleep. Finally the pills were
 “ ordered to be continued every ghurry, until the pati-
 “ ent slept, and soojee (a nutritious gruel made with
 “ wheat and flour) *cold* and diluted with milk, was to
 “ be supplied as drink, alternately with the aromatic in-
 “ fusion of basil. Such were the simple means by
 “ which very many lives were preserved, not only to my
 “ judgment, but in opinion of the natives themselves of
 “ all ranks and characters.” Any one, by looking at

Celsus, will see in how far some of the above measures seem to have been successfully employed. It is easily to be perceived that such a mode of treatment, although well adapted for the more mild cases of Cholera, would not be found of great avail in the severe forms of disease. Calomel and quinine is an indispensable medicine, I should give it in every case this, as before noticed, will not interrupt our other proceedings only as being a sedative, we may abstract and with advantage, much of the opium from the prescriptions. Our author's idea was to restore the alimentary secretions, and it was fortunate that the cases were of such a tractable nature as to yield to purgatives, but, as already noticed, there are many instances in which they will not do this, so that we must have recourse to the other remedies so well calculated, as mercury is for effecting this *sine qua non*, in the successful termination of the attack. But as there is no one remedy of itself calculated for restoring *all* the secretions, it will be proper, in the more mild forms of the disease, or where there is vitality in the system to aid us, or where re-action has occurred from the more severe forms of the attack, to have recourse to a combination of such as are calculated to act generally on the various functions, without tending to decrease the energies of the body. For this purpose, a combination of sudorifics with gentle laxatives, will be proper. We have many remedies in the former class well adapted for acting on the surface without in the slightest degree tending to depress, such we will find some of the preparations of ammonia. As opium in combination with some other remedies, is of itself liable to render all the secretions torpid, may even to check some entirely, we will do well to have recourse to those which seem to neutralize, in a great measure, its other bad properties. The

Dovers powder will be found to answer extremely well for this, and, when joined to calomel, it can be safely and usefully administered, as often as thought proper. Cream of tartar, added to water gruel, or any other suitable beverage, will also be found a useful medicine, since by this means we not only act gently on the urinary organs, but also on the intestines. The combination of remedies, calculated for bringing into operation several powers in the system, at one and the same time, is never to be lost sight of in the treatment, when the more severe symptoms are beginning to yield. Of these there are many, it is deemed superfluous to say any thing more on this point, since each practitioner can select what he thinks most applicable for effecting particular indications, as presented in particular cases.

RUBEFACIENTS.—For relieving spasmodic affections of the muscles, it is believed that the more successful plan will be to overcome the vomiting and purging, in proportion to these abating, so will we find the cramps give way. It has been stated, that stimulating liniments or rubefacients have seldom done good, at the very onset of the disease. There are some, however, who use them in every stage and with much success; they will be found of great utility in those cases in which the muscles keep, as it were permanently contracted. Many formula of these can be selected, it is imagined that the following will be as good as any of them which may be used frequently with advantage, for relieving the severe and torturing pains in sciatica.

℞ Tinct. opii
 Spr. æther sulph.
 Spr. camphor. *aa* ʒij M.

or

Rx	Liniment saponis	ʒij
	Spr. camphor.	ʒi
	Ol. origani	ʒij
	Tk. opii	ʒss M.

These will be found improved by adding the tincture of catharides. As they are not suited for Hospital practice, however they can be easily replaced by others of a less expensive nature. If the cramps in the belly of the muscles should continue for a length of time, we may rub the places with flannel and warm spirits, such as whisky, rum, arrack, and if we add a little of the capicum vinegar, so much the more benefit. Each practitioner can select for himself, such as the ammoniated liniment, or this and turpentine, or hot turpentine itself. The cajeput oil, either by itself, or mixed with others, we will find perhaps to be the best of them all; it has a fine warming and pricking operation, by no means disagreeable to the patient. There are many other stimulating remedies that can be used in this way, or we may heighten the operation of the others by adding any of the essential oils, and some of the more heating tinctures. Fomentations may be used, but they will be found of little efficacy in removing inordinate muscular action in cholera. They may, however, when the cramps are slight be used over the region of the stomach, or over the abdomen, &c. If any trusted to them alone for removing this action, when more severe, they would be disappointed.

DRINK.—We may now consider the propriety of allowing our patients liquids for quenching the insatiable thirst which so frequently harrasses them. Many of the older authors agree as to the giving diluent drinks.

These are not only useful, but I might almost say indispensable, in that variety of the disease attended with a great profusion of bile. As a general practice, in the epidemic of India, their indiscriminate use is questionable, and we have, as has been fully shewn, matters of more importance to attend to, than the mere dilution of the stomach and alimentary canal. As some advantage, even in these cases, is to be derived from their administration, it will be proper to enquire what are the best for allaying the unquenchable thirst. Cold water has been administered, but, for evident reasons, this can only be in mild cases. "Lienard half a century before the time of Sydenham, gave it cold and fresh from the fountain, and as he assures us with great success, and Cleghorn has recommended the same practice, even in hot climates, in our own times." Cold may certainly act as a sedative or stimulant, under certain states of the body, as well as the heat, it is not therefore the most proper in many forms of the disease, but may be usefully given, in those cases in which the heat of the body is above temperature. Drinks when given should never be of pure water alone, they should be medicated, and in the form of gruels, or mucilaginous, with the chill taken off, and should be joined with some pleasant aromatic, spirits, or wines according to the particular intention required. In the epidemic form of the cholera, it has been stated, that the thirst is distressing beyond measure, the patients often complaining of nothing else, the cramps, vomiting and purging they say is but slight when compared to this. Our patients may, under these states, drink as much as they please, but nothing will quench it, it is like throwing water on a large fire, which at the time tells but little, as the flame will afterwards break forth with increased vigour. The

drinking of large quantities of fluids is by no means proper, especially when the stomach is very irritable, or when they are likely to offend from bulk alone. The stimulus from the bulk, as well as the quantum itself, proves injurious by causing an inertness of our remedies, as well as by hurrying them through the alimentary tube, or they are apt to renew, not to subdue the vomiting and purging. Allowing that the medicines did remain in such instances as the above, they would, from mere delution, be rendered inert. The judicious use of fluids becomes a point of much moment. Sometimes great benefit may be experienced from washing the mouth and throat, or gargling it, this may at times relieve the most distressing symptom.

The mineral acids, properly diluted, brandy and water, or wines and water, or water gruel, or decoctions and infusions of odoriferous herbs, peppermint or cinnamon water, with a little brandy, may be all usefully employed in the more severe forms, and should not be given cold, for, in such a state, they would substract a quantum of heat, which it is our wish to preserve. In the less severe attacks, and especially in the bilious, we need not be so scrupulous in this respect, but even here we must attend to the former habits of the patient,—whether he has been accustomed to live well or the contrary, as well as other items. A point of great importance in all cases, is to give drinks joined with some nutritious substance, either during the continuance of the severe symptoms, or after, by this means the stomach and intestines will be defended from some cause operating within, that might otherwise have offended them. A good ptisan will be found in thin arrow root, with a little port wine, or brandy, with a good proportion of nutmegs or cloves, or any other pleasant aromatic. Sago, tapioca, mutton

or beef tea, and many more could be added to the list. These may be made of a more firm consistence, and be usefully administered as food during convalescence, giving three or four table spoonfuls at a time, but frequently repeated during the day. The compound tinctures of cinnamon would be an excellent addition to many of the above. We will find that some prove more palatable than others, and of course we should select the most agreeable. Other articles can be added calculated for fulfilling other indications of treatment, as tamarinds, prunes, cream of tartar, &c. The drink, called imperial, will be also of great service in this way.

EMETICS.—Have been employed by many in the treatment of cholera ; it will be proper, and indeed it is now time to enquire, in how far they can be depended on, and also their *modus operandi*. In strong and robust habits, Dr. Paisley gave tartar emetic. Curtis observes that “in relaxed habits, where the pulse sinks suddenly and brings on immediate danger the same method can be pursued but with great caution.” At the formation of the attack therefore, emetic tartar might seem to be a good one, for, independent of its exciting vomiting, it has some beneficial action on the liver by exciting the flow of bile and rousing the system generally to a performance of its regular secretions. This medicine, from its sometimes harsh operation, is more usefully employed in the more robust frames, and where our object seems to be to excite the flow of bile. In weak patients, we ought to employ such as are not so liable to injure from this cause. Dr. Kennedy observes “bleeding to reduce the nervous irritability,—an antimonial emetic to excite the constitution to its natural process, to relieve the collapse, followed by the castor oil with laudanum—the use of sulphate of lime instead of tartarised antimony might

“be desirable.” Here we have a sedative and stimulating mode—how is this to be reconciled with the opinions of some medical men. The Doctor, in place of using emetics as a general practice, had recourse to warm water with the intention of assisting the efforts of nature, these, when used at the onset of the attack, seem to have been attended with considerable success. Emetics are certainly serviceable in many cases of disease, or accidents which would act with equal rapidity on the nervous system. They are most beneficially administered where poisons have been taken, or against the bite of snakes, not only with the intention of evacuating the contents of the stomach, but for rousing the system. With this latter intention they are more particularly serviceable in cholera, and those which operate with quickness and certainty, as well as with ease to the patient should be selected. Such then we will find the sulphate of copper, as this can be safely administered in the latter stages of phthisis, and with manifest advantage for the time being.

That great medical master Cullen observes, that when vomiting is excited by medicine, it “agitates the whole of
“the alimentary viscera, expedites the circulation in them
“and promotes their several secretions; and, lastly, as
“agitating the viscera of the thorax, it has like effects on
“these.—The operation of full vomiting commonly soon
“ceases, and the exercise of vomiting is often a *debili-*
“*tating* power; and therefore, when the vomiting does
“not remove the atony and spasm very entirely, it *may*
“*give occasion to their recurring with greater force.*
“Emetics thrown into the stomach and operating there
“in the time of the cold stage (of intermittent fever)
“commonly put an end to it, and bring on the hot
“stage.” In the preceding portion of the paragraph he

seems to think that this takes place as "one of the means employed by nature for restoring the determination to the surface of the body." This action is fully accounted for, from the stimulus which they are apt to excite after their full operation. Be it observed, that where they do not produce this, they depress powerfully, and also, that with their first impression, before the active operation is made in this way, when they have operated, the stimulus commences. Any one might be apt to imagine that in a disease of the nature of cholera, in which there exists so much irritability of stomach as well as the alimentary canal, with the great tendency to a general overpowering of the whole system, that emetics, so far from doing good, would but add to the evil. The utility of emetics, in diseases of India, are much disputed by several authors, and it is believed that, as a general mode of procedure in cholera, especially the more severe forms, they must give way to a more decided and less objectionable mode of practice, as in the words of Cullen "the exercise of vomiting is often a debilitating power." As has been already noticed, the vomiting and purging in cholera generally graduates the scale of spasmodic actions in other parts, the recourse to emetics must, at all times, especially in the advanced form of attack, be a dangerous and an all-powerful depressing cause, as the very action produced by the emetic may now accelerate the fate of the patient, by causing a greater disturbance than might otherwise have occurred. If applicable, and I have little doubt, but that they are in some instances of the less severe forms, they can only be safely used at the very formation of the attack, for by this means we may, by rousing the system, turn the tide of affairs in our favour. Such cases are perhaps better treated by the cleansing or di-

luting mode of draught of warm water, than the exhibition of an emetic, this will assist more powerfully the efforts of nature. After vomiting has been excited by these drinks, and the action abated, then is the time for our remedies. Emetics are used then with the intention of *rousing* the whole powers of the body into more active operation, thus, in producing re-action, we have a very favourable opportunity for keeping this in play, by the exhibition of other medicines, they can only it is imagined be advantageously used in such cases as those in which the patient's constitution and habits of body are such as to bear their operation well. Emetics, as has been noticed, will not answer in all cases of disease, in particular in the more severe forms of cholera, or in the more advanced stages of any attack, for here the powers of life are seriously and dangerously oppressed. Besides, if we did attempt their administration in those instances in which there is such a torpidity of the nervous system, as happens in the first onset of disease in some instances, the medicine might only be in part ejected not from any action which it had excited but by the vomiting attendant on the disease, hence one portion remaining would produce an effect altogether different from its other operation. If the stomach retains the power of transmitting to the general system, the medicine will prove injurious from its nauseating properties, and thus, in place of doing good, will positively do much harm. The warm water practice of Celsus, and others might be proper under such circumstances, but there is also an evil attendant on this, there is too much fluid thrown into the stomach and bowels, and it proves a cause of distention to the intestines, without being able to do any good, since there is nothing of an astringent nature in it ; in addition, on the administration of our

other remedies, they, by being so much diluted, would from this cause alone be incapable of acting so fully on the system. A few drops of an acid will act more powerfully, in combination with a few drachms of water, than it would do in as many ounces, just so would it be with all our other remedies. This may be another reason why we are so often foiled in the treatment, for whether the fluid be furnished by ourselves, or from the body, our remedies will thereby be rendered inert. Do we not in all cases on inspection find a very considerable portion of fluids in the stomach and intestines, even although such have been but sparingly administered during the treatment.

But, in defiance of all these remedies, we will still find cases to baffle our best directed means of cure. We want some power or medicine which will operate by rousing the nervous system, as well as the circulation of the blood, which must be forced from its lurking abodes. For such, a few observations may be now made on the internal administration of two remedies, not hitherto employed in the treatment,—*cantharides* and *phosphorous*.

CANTHARIDES.—When administered internally have a constitutional and local operation, the circulation is thereby roused; whatever medicine does this must, as it acts through the medium of the nerves be beneficial in the more severe forms of cholera, with this proviso that it is not a poison. Mr. Robertson observes with respect to their administration in *gleets*, *leucorrhæa* and obstinate sores, that the quantity of *cantharides* some take in a given time without any sensible effect, is astonishingly great, compared with the smallness of the quantity which can alarmingly affect others. Let us fully state what we have to dread, and what to hope, from the administration of the tincture, in cholera of the malignant

type. The cantharides, when first taken, enliven the functions of the mind and body, increase the celerity and force of the circulations, improve the appetite, increase the flow of urine and perspiration. This is exceedingly good, and what seems to be required in the treatment of the epidemic. But let us turn our attention to the injurious effects which are occasionally produced even in a healthy man, when they have been taken for a longer or shorter time. According to peculiarities of the patient's habits, cantharides lose the power of accelerating the contraction of the heart, and even seem to retard and weaken its operations; when the dose is too great the symptoms are tremendous, the torture which they cause is exquisite,—the stools become mucous, purulent and bloody,—the urinary discharge is either suppressed or bloody—the functions of the mind and body suffer complete disorder,—symptoms of gangrene supervene and terminate speedily in death. By pursuing a medium course we can easily avoid *scilla and charybdis*, and I really do think that cantharides are a remedy well calculated for fulfilling several of the more important indications to be attempted in the treatment. Let it also be borne in recollection, that our patients under the circumstances supposed in cholera, wil', in general, be better able to bear the administration of this, than in those instances in which we have nothing like the same extent of oppressive action on the powers of the two functions noticed. This medicine will promote the activity of the animal and vital powers, if they can be raised by no other means, and must therefore prove highly serviceable. When therefore we are unable to maintain such in any other manner, they, by their administration, may, in all probability, excite and maintain that proper degree of activity, during which the system or the injured organs,

will return to the performance of their functions. As the more severe symptoms only last for a short time, perhaps a few hours, in which the disease runs through its course, by inducing re-action we may just put them in possession of the equilibrium which they were on the point of losing. For internal administration then, we will find that ʒij of the tincture to ʒij of mucilage of gum arabica is a good formula. This may be given in four, five, or six doses, according to the severity of the symptoms, and at an interval of from twenty minutes, to half an hour, or an hour. I know that larger doses may be administered, without the risk of producing any serious disturbance, especially in this disease, even to the amount of a drachm at once, which can be again repeated. The same rule applies here as elsewhere, regarding the administration of stimulants, they are to be repeated in such doses, and at such intervals, as the nature of the case demands. In all cases of inveterate disease, we must have recourse to strong measures, especially in cholera, for we are certain that if we do not cure, the disease will kill. Under such circumstances does it not appear more satisfactory to have a patient to treat for an inflammation from this cause, if the cantharides should save life by establishing re-action, than to have him die at once from the attack. It may be a good remedy in all those cases requiring the more powerful stimuli, but administered in smaller proportions as of a few drops in combination with our other remedies which should be generally given in mucilage; in this manner also, it is imagined, that much benefit may be obtained from it, care must be observed not to add it to those medicines such as camphor, which are said greatly to destroy its action. Experiments have been made shewing that when joined with camphor, its effects were not by any means so powerful as when

given by itself. When, on re-action of the system, and the cantharides are likely to give much trouble, there are various means by which, we may, in some measure, counteract their bad effects,—such as the administration of mustard whey,—by camphor emulsion and others. It is superfluous to enlarge on this point, for when properly administered, in the manner proposed, and considering the impaired powers of the body in cholera, I should think that we have but little to apprehend from any great disturbance which they are likely to produce. For would they not be in a great degree carried out of the body by the loose stools which so frequently attend the stage of re-action,—they would also be well diluted by the drink, as well as the fluids of the intestinal canal; in this way also they would be carried forth ere they could produce the more severe symptoms which *sometimes* attend their administration under other states of the body. Nay, with this view, in the very very severe forms we may even carry these to the extent of drachm doses every hour, or so, according to the effects produced, and to four or five of such doses. Such then are the advantages to be derived from the interval administration of cantharides in tincture, which is the mode I should prefer; it is believed that most on trial will say that it possesses powers which few other stimulants in the same quantity do, in the treatment of cholera. This power being permanent too, which is the great point of importance, renders it a medicine well worthy of trial. I now propose to offer a few remarks on—

PHOSPHOROUS.—This is one of the most powerful *exciting* medicines we possess. In former days, several medical men have tried it in *all* cases where a high de-

gree of nervous debility prevailed ; accordingly in nervous fevers, paralytic affections, impotentia virilis, epilepsy, &c. also in arthritis nodosa, et arteriosa it has proved very efficacious. It has been used in cases of poisons from lead and arsenic and with some success. Although an old remedy for these diseases, I propose to introduce it as a new one in cholera, for I am not aware that it has been used by any in the treatment ; that is not, however a reason why it should not be tried. There exists, says the journal from which I shall extract a paragraph or two, at least one instance of a person, who having been poisoned in Italy (probably with aqua roffana) became quite emaciated, his nails and hair fell off spontaneously, and his life was only saved by phosphorous. Its effects are at the same time in a considerable degree diuretic and diaphoretic. I have given the favorable side of the question ;—let us look to its injurious properties. I should be sorry indeed did any medical man go heedlessly or carelessly to work without knowing distinctly the dangers to be encountered from the administration of this or that medicine. It sometimes causes a violent inflammation of the stomach and bowels, even at times in the dose of a grain and half, or two grains, accompanied with very burning pains in the hypochondria, and this terminating in death, producing induration and scirrhus of the stomach, which afterwards occasion chronic cardialgies, or a habitual vomiting, emaciation and hectic death. These ill consequences are in a great measure owing to the mode in which it is administered, either by giving it in substance, or in too great a dose, as in the first case, the minutest particle of it may, by adhering to the stomach, produce an inflammation or at least an induration. The form therefore in which it ought to be given should be such as to have it in solution, and not

in substance. A solution may be made in oil, but this is too disagreeable to take, a solution in æther, or naphtha vitrioli, in which the phosphorous entirely dissolves, by this combination its heating and irritating qualities are exceedingly increased, and as only eight grains of phosphorous are soluble in one ounce of the æther, 120 drops must be a dose to bring one grain of it into the body. However this naphtha phosphorata may be of great benefit in a high degree of nervous debility, combined with a total want of sensation. The following form of giving phosphorous internally, will therefore, be the most proper on account of containing it dissolved, and equally divided throughout, having it sufficiently involved in mucilage, to prevent any ill consequences from a local irritation of the stomach even in very sensible constitutions. The phosphorous is rubbed with sweet almonds, or a sufficient quantity of gum-arabic, to make an emulsion, and, by an addition of spiritus nitrici dulcis, or liquor anodynus, the taste and smell of the phosphorous are rendered less disagreeable.

R phosphor : gr. 3 subigantur longa trituratione cum mucilagine gum-arabic q. s. ut fiat cum aqua fontan : 3vj. emulsio cui adde sysupi de althæa 3i. Liquor anodyn : miner : Hoffani gtts. xxx. In this way a very efficacious solution will be obtained, which shines in the dark, and is agreeable enough to be taken, the dose is one table spoonful every three hours, or more if requisite—see Med : & Physic : Journal Vol. IV. Now this as a remedy seems wonderfully well calculated for fulfilling some useful points in the treatment of the very severe cases of cholera, it raises the powers of the system,—this it certainly will do if they are to be enlivened by any medicine. To be given in proportionate doses as all other stimulants according to the effects produced. The

same remarks hold equally applicable to this remedy as to that of Cantharides, and I certainly would not hesitate in administering it in the cases alluded to, provided nothing else will *rouse* the system. We need not be greatly afraid of inflammation in a disease under the circumstances we treat this one.

As relapses in cholera are by no means of an unfrequent occurrence, great care is required on the part of the patient that he be steady and obedient to the orders given. He must avoid all fatiguing exercises, indigestible food, and his diet should be of the lightest and most easily digestible sort. He must take especial precaution not to expose himself too much to the chills of either the day or night. Arrow-root, Sago, tapioca, and the like will be the most proper for the first day or two, to which we can either add wine or spirits, with some pleasant aromatic according to circumstances, and as the nature of the case seems to demand. As he gradually recovers strength, then we may administer the other more easily digestible forms of diet, always observing that he is not allowed to indulge in eating or drinking too much, he ought rather to take little at a time, and more frequently during the day, than make a good meal at once. By proceeding in this manner we will effectually guard against any unpleasant consequences from this source. The bowels are often long capricious or unsteady after the attack, in such instances we may do well to treat the patient under the idea of an irritable state of the bowels and general system, for here, as well as in other irritable states of the body, he feels uncomfortable, teased, fretted or short of temper, &c. Blood-letting is in no case to be used unless imperatively demanded, for by the misapplication of this, even where the system seems capable of bearing the abstrac-

tion, much harm will be done. Our leading object is to restore the various secretions to their natural state, this may be now most effectually accomplished by gentle laxatives. For this purpose we will find the compound rhubarb pill, in such doses, and at such intervals, as to operate gently, of much service. Or, we may give the infusion or decoction of bark along with it, as this condition of the bowels depends greatly on debility and torpor, Or, we may choose the following, to three or four drachms of sulphate of magnesia, add as much of the powder of bark, pour on this about a pint of boiling water, and allow it to remain for some time ; then decant, and give the patient a wine glass-full three or four times daily, some powder of ginger may be added to make it more palatable. The blue pill and rhubarb, administered in such doses, and at such intervals, as to act gently on the bowels, seems admirably adapted for such a purpose. We must not at any time be over-anxious to operate on the bowels with cathartics, but we must sooth and give them time to return to their proper state. All strong remedies in this way must be avoided, if we are not desirous of producing dysenteric attacks, with protracted cases of convalescence. If any man be so foolish then as to administer the *ol. tigllii* ! I would certainly fine him a couple of guineas for every drop that had been given ;—this is the most detestable remedy which any one can possibly use. Castor oil with mucilage, with or without tincture of opium, will be found a most excellent medicine for acting more fully on the bowels, when such is our object,—taking care, at the same time, to give our blue pills with quinine every morning, or oftener if required. There are many cases which will assume a dysenteric character, when re-action is fully established ; this is not to be wondered at, since we

have the alimentary canal in such various states of vitality, according as the nervous power of this or that part has suffered during the progress of the disease. The blood vessels are consequently disgoring themselves of the bad blood they contain. Such cases are to be cautiously marked, and not to be interfered with too hurriedly, or allowed to proceed to the other extreme of becoming a fixed disease. Oh! the ol. tigllii, what nice work for you here! as to the management of such I refer to dysentery. There are cases of Cholera to be met with of a periodical nature, (so we are informed,) as to the cause of these we might as well enquire into that of intermittent fever. Such cases are in general attended with slight symptoms. The use of tonic remedies we will find of peculiar efficacy in the treatment of such,—the more especially as all cases of Cholera are apt to be followed by a debility of the digestive organs. Such remedies therefore become indispensably necessary; for this purpose we employ decoctions and infusions of different bitters, these we will find answer well. Colombo root, gentian, cascarilla bark will be usefully employed. A very good combination may be the following, cascarilla infusion ʒiiss, tincture of colombo ʒiij, compound tincture of cardamon ʒi M. take in divided doses three times during the day. I observe also that wine will be most properly administered to the weaker patients. Such then seems to be the general principles for our guidance in the after treatment. We will not unfrequently observe that many cases get speedily well, after the primary attack has been subdued, these may, or may not require medicine, the generality of cases, however, do really admit of much attention, for we will not unfrequently find this state of the system, induced by the operation of the Cholera, to be far more difficult to manage than very many cases of the original attack.

Every practitioner, however, must be sufficiently acquainted with the general principles of the profession to guide him in this respect, by aiming at the restoration of the various secretions, and giving stability to the human frame.

I must now, in conclusion of the essay, apologise for entering so fully into many points, seemingly detached, or unconnected with this subject, as well as dwelling so much on several points of the treatment. But when it is considered that the subject is one in the highest degree interesting, especially at the present crisis, and that none have so fully expatiated on these particular parts, I hope that this will screen me from the imputation of being too prolix. If these observations tend in any way to the alleviation of the sufferings of my fellow men, my object is gained. Independent of all that has been urged, and from my knowledge of the disease I must say that there are cases to be met with which will give way to no plan of treatment, and will baffle our best directed efforts for their relief. The reason of our failure, has already been pointed out, in several parts of the essay, and such will continue to be the case, unless we adopt measures to keep up the play of the nervous, as well as the action of the sanguiferous system. I now beg to add, that it is to be hoped the day has gone past, when the chicanery of a few assuming individuals, sometimes put an end to all philosophical discussions amongst their own circles by their impudent *ipse dixit*, or *vetos* like the Roman Lictors of old,—I forbid it,—I do not think so,—it cannot be so, and the like foolish expressions constantly in their mouths. Here are points stated, requiring a true and impartial philosophical mode of reasoning, and must be answered in this way; not, however, with the spirit of malevolence, or the proud boasting of abilities where none actually exist. “A man whose

“ mind is expanded by knowledge learns to respect
“ the opinions of others ; from an intimate consciousness
“ that error roots itself in the rank soil of self-confi-
“ dence ; but a man of scanty information, and being
“ arrogant in mind, or eager for pre-eminence, is anxi-
“ ous to hide his poverty, by his presumption, and to
“ gain by insolence what he cannot win by merit.”

*Si novisti aliquid rectius istius candidus imperti—si
non utere his mecum.*

The reader is requested to take into account the following omissions in their proper place.

At page 108, after the words “ we may have an opportunity” then is to follow—

His Majesty's ship *Alligator*, on, or about the 19th September, 1833, while in Madras roads, painted the gun-room, Midshipmens berth, &c. There immediately occurred cases of bowel complaints,—some by no means mild. These were, at the time, supposed to be owing to the drinking of ginger beer, and the eating of fruits purchased from the bum-boats. On the 22d, I left her to join the “ *Undaunted* ;” and on the 23d, she sailed for New South Wales. The same evening a Cholera case of rather a severe nature occurred. The next day another, and so on, adding sometimes two or three daily, until the 1st October, when she reached Prince of Wales Island ; there were only three cases of death,—the last occurring this day. From the time of departure till she passed Carnicobar Island, (on the fifth day) the weather was very boisterous and wet, and the decks never dry. After passing this Island, the weather, although squally, was by no means so bad. In the above instance, we observe the cause certainly lurking in her, and brought into effective operation by the attending circumstances of wet decks,—the necessarily confined air within her, and the peculiarity of the weather. These were the only two ships which had Cholera, while lying in Madras roads. On the 1st October, (the moment she hauled her wind, and, after the death of a fine young Midshipman,) there was not another admission on the sick list. Do we not see from this example what our object ought to be,—viz. to proceed as quickly as possible to good and dry weather, and lay the ship broad-side to the breeze,—that being the best position for free ventilation ?

His Majesty's ship *Satellite* arrived at Trincomallee from England, in the beginning of April 1828. Shortly after she sailed for Madras, and thence to Calcutta, where she arrived in the early part of May, there being only two or three cases of a local nature on the sick list. The first four or five days, while at this anchorage no increase of sick : but mark the change when she painted. The cholera and bowel complaints now assailed her, and increased daily, till there were above thirty admissions during the next nine days. After leaving Calcutta, where she had remained upwards of a fortnight, the paint being now dry, no more sickness of any moment occurred, unless two or three cases of slight bowel attacks on her passage down the Hooghly, and by the time she arrived at Madras, the ships company were in perfect health ; she had to beat against the monsoon, and was three weeks on the passage. It was evident that at Calcutta, the cholera atmosphere was present, since the malady was committing some depredations on shore, as also among a few of the other ships in the river, but certainly not to the same extent as in her. As to the condition of these ships I cannot say whether they had painted, although I believe it extremely probable, as also that they might not be properly ventilated, or their holds in the best order. Another instance may be given in that of His Majesty's ship *Hyacinth* ; she arrived at Madras from England in the month of October 1833, and sailed for Calcutta the same month, where she re-fitted ; she also was rather sharply attacked by the Cholera, and be it observed from the same causes as the above.

His Majesty's ship *Curaçoa*, about the 19th September 1834, while at anchor in Madras roads, painted. The same evening, or next day, a case of a febrile nature occurred, then another, and a third of a more determin-

ed aspect. Cases of this nature continuing to increase, she was, on the evening of the 28th, very properly sent to cruise. While she was absent for ten days, these cases amounted to above forty, in addition to the casualty ones, many of which were boils and small irritable ulcers. It may be asked what this sickness was occasioned by, no other ships in the roadstead being assailed, the weather at the time being variable, and near the change of the monsoon. The cause of production must surely have existed within herself, and that this was owing to the paint, aided in its operation by the unsettled state of the atmosphere, few, if any will be inclined to dispute. It will be seen that the sickness in the "*Curaçoa*," occurred somewhat more than a year after the cholera in the "*Undaunted*," and "*Alligator*." That she escaped this justly dreaded distemper, I think there can be little doubt, and it is believed had the same peculiarity of atmosphere been present, as in the previous year, she would have been extremely liable to have had a very severe attack. It was fortunate that such was not the case, for there was no cholera at this time, either on shore or afloat. I must observe, however, that there existed within herself a sufficient cause of production of this febrile malady, this, aided by the dampness of the air, produced the peculiar modification of disease. There is a circumstance of rather an odd nature connected with this disease, the sickness occurring chiefly, if not solely, amongst those who slept and messed in the aftermost two-thirds of the ship,—the Officers forming a very large item in the numerical strength of the sick list. Those who messed in the foremost, one-third escaped, I may say to a man. The reason of this fact may be accounted for on the supposition, that the galley fire being on her lower deck, kept up a continual circulation of pure air. this,

aided by the windsails, kept this part of the ship free of the noxious particles emanating from the paint. Why those in the aftermost, two-thirds suffered, may at once be named, if we only consider the more extended surface painted, such as the poop, officers' cabins, &c.

From the above, it follows that every considerate medical man, in the intertropical climes of the East, will put his *caveas* against painting ships, houses, &c. at these particular periods of the year. I observe that any cause which tends to destroy the balance of the nervous power, particularly by its reduction, will render the body to the same extent susceptible, and it will be acted on according to the extent of the derangement produced. When we hear of ships being singly attacked, we may confidently look for the exciting cause at least existing in a major degree within herself,—whether this proceeds from paint,—or the bad state of the ship as regards cleanliness generally, or of her holds, with inattention to proper ventilation, &c. I have more than once observed, and could adduce facts to prove, that at the periods of the year alluded to, many men were attacked with fever, merely from exposure to the effluvia, while working in the holds, and that the only sufferers were those who were exposed to such by day and night, with a variable state of the weather at the time being, and I am positive of having witnessed some spasmodic cases of cholera, solely attributable to this cause. There is another odd occurrence which I have not failed to observe more than once in these general attacks, as regards the state of the blood. It is very black and resembles that, which is but too often met with in cholera. These patients do not bear bleeding well in an erect posture, they should therefore always be bled in a recumbent position, else, in many instances, we will fail to obtain enough for the posi-

tive amelioration of symptoms before syncope is produced ; even the most robust, in an erect posture, cannot, in general, bear the point of full abstraction. Does the above not shew that the operating cause is the same, but minor in degree ? Let none bring forward these cases to condemn the opinions advanced as to the treatment of cholera, in so far as venesection is concerned. There is a most material difference in them, since the innate powers of the body are not so severely assailed, as in the more inveterate forms of cholera,—this at least forms a point of consequence. Let none then imagine that I draw a close resemblance between them and cholera. In the remittent fever of many parts of India, *when action is fully present, as indicated by the full pulse, hot skin, &c.*, then is my time for using the lancet, so as to give the most effectual relief, and let me observe here, that I would not think of phlebotomising merely for the purpose of going through the forms by only detracting a few ounces at the first, and then, in all probability, be compelled to repeat the operation a few hours after, when now we find re-action established. Why then not wait until action be well in being ? In the “*Melville*” in October and November 1834, we treated upwards of 280 cases of fever ; my friend Mr. J. Stiven and myself bled, not according to the stated number of ounces, but for the relief of symptoms, and we seldom if ever failed to accomplish our object of giving a decided relief, by the first bleeding. There was blood taken away from these cases to above *one Hogshead and a quarter !* This, be it recollected, is not by any means a random statement, but it is the aggregate of the ounces actually added together. I recollect well the case of a boatswain’s mate, who came complaining of severe pain of the forehead, with pain and suffusion of the eyes, and the other usual

symptoms of this fever, I took from him at one bleeding sixty ounces, and this with the most decided relief of all the untoward symptoms. At the very time this man was undergoing the operation, my own servant was bled to the extent of fifty-six. The first of these cases was at duty in four or five days, with not an iota of complaint of debility, the other not so soon, yet he was not much reduced. Here the patient's strength was saved, and the disease checked at once, which is certainly far more preferable than allowing our men to remain long on the sick list, by an improper mode of treatment. The blood, in all these cases, exhibited the dark colour so characteristic of cholera, &c. and only in three or four instances did it shew the buffy coat; generally, after flowing some time, it became not only more fluid in appearance, but also much more florid when the patients seldom failed to experience decided benefit.

REMARKS
ON
BERIBERRI
AND
DIET,
AS CONNECTED WITH
ENDEMIC AND EPIDEMIC
DISEASES.

CHAP. I.

SYMPTOMS, &c.

In taking a succinct account of Berriberri, it is intended, if possible, to elucidate the nature of a very troublesome, and perhaps a no less fatal complaint than Cholera, which some few years ago committed considerable depredations amongst our troops, and the other inhabitants of the Island of Ceylon. The disease is not indigenous to the Island, as it is also occasionally to be met with in other parts of India,—in particular along the adjacent coasts. Previous to entering on the Etiology, or Pathology, of berriberri (which in so far as I am acquainted, has not hitherto been satisfactorily explained, nor has it been classed with any other disease, it may not be improper to look at our catalogue, and see whether there are any with which we may contrast it. There are none of the dropsical complaints which, in their primary symptoms, resemble this, as to the very rapid prostration of strength, more especially in the more malignant species. I, with some diffidence, select one, with which, however, in the minds of many there may be considerable difficulty to encounter. It is imagined that berriberri bears a close approximation to cholera, in so far as it runs an equally rapid course, and for other reasons which will appear in the sequel; forgetting for a moment only, that it has some analogy to hydrothorax, ascites, anasarca, and other watery effusions, with this addendum that it is accompanied with a waddling or paralytic state of the lower extremities,—at all events with an incapacity of *free* movement. In turning our attention to the symptoms, and contrasting them with those of cholera, it is not intend-

ed to go over the whole of them, but only the most prominent in each, satisfied as I am that all of them will be found to bear some near, or distant relation, according to circumstances, and what we might expect to meet with from the nature of the diseases in assailing the different textures and organs of the body : the arcana of this complaint, as regards its cause or causes, will fall to be considered in an after part of the investigation.

It must strike the mind of a superficial and non-superficial observer who have had opportunities of seeing cases of each complaint, especially in their more malignant forms, that both are, in a vast variety of instances, almost equally fatal in so far as regards the space of time. What can be the parts assailed by the operating cause to produce death so speedily, by acting in many instances like poisons ? Many cases of Beriberri and Cholera could be adduced which have run their fatal course in from six, or eight, to thirty hours. The disease, more immediately the subject of enquiry, is under ordinary circumstances much less severe than the other, for obvious enough reasons. Such as from the nature of the parts operated on, or those primarily attacked, being generally speaking less important to the general system than the functions which keep vitality in operation. It has been shewn that in Cholera, the nervous system is not only overpowered at its very centre, but also its very extreme parts are also shaken by the universally oppressing cause. Now Beriberri it may be said has for its real cause a *deficit* of action only in the extremities of the nervous system, which is not propagated to the brain, operating in many instances only on a part of the body ; as the lumbar region of the spinal cord, and nerves of the lower extremities. From this circumstance we have a little more breathing time, not only for the judicious

application, but also for the operation of our remedies, since the powers of the stomach and other portions of the body are less deadened, than they are in Cholera, and it is, in most instances, only towards the termination of the attack, or in the malignant type of the distemper that such come to suffer. The more mild forms of beriberri, so far as regards the derangement of the nervous system, we might aptly enough compare to the bowel cases to be met with during the prevalence of the other epidemic, every one will admit that such examples are only modified ones of that disease, dependent on the above as their primary cause. The connexion therefore between the two, if the above is admitted, is more close than might have a priori appeared. Beriberri makes its assaults under three forms or varieties, these with propriety may be reduced to two. What has been termed the Ceylon palsy and the more mild forms may be united together, in this we follow the arrangement of Mr. Henry Marshall, and thus reduce the division to the benign and malignant.

But the benign variety, (if such a term be very applicable to any inveterate disease) like the more mild cases of Cholera is very apt to terminate, and this quickly in the more malignant ; great care is therefore required to watch assiduously every case, from its earliest appearance. As to the rapid fatality of the distemper, it is stated that this “ took place generally in a sudden manner, very frequently while speaking to one man I have “ been called to another, whom I had just left under “ promising circumstances and have found him gasping, “ his eyes protruded, his hands clenched, and a few “ minutes have closed the scene : It has sometimes “ happened that the man I was addressing has been “ off in the same manner.” There is something in this

passage to reconcile us to the new view of the complaint, the sudden death, the involuntary action of the muscles, as in the clenching of the hands, and the hurried respiration so observable towards the close of Cholera, are here all exhibited, but in perhaps another set of muscles, evidently shewing that there is the same cause in operation as exists in Cholera and some tetanic cases. It is unlike Cholera in this that it does not afflict new comers, generally speaking, until after some months residence, or until the nervous power becomes liable to be assailed by the operating cause. There is also the Hypocratic face truly characteristic of each, the hurried, or accelerated respiration, is present in many instances of both. Let medical men ridicule the opinion as to the nervous system being that primarily assailed, and acted on in the production of various distempers, also as to its acting like a galvanic power, or a something analogous. Can they say what are the whole purposes the nerves serve in the animal economy,—that they are of every import to it, none but a madman would attempt to deny. Therefore being a part and a principal one too, it is surely ridiculous in the extreme to put a negative to the subject that when attacked they will not transmit disturbed action to a portion or to the whole body. Can any one pretend to state the extent to which this may proceed?—none—for it may be as various as the number and amount of the exciting agents, or as a combination of such is capable of producing. This even as arising from an inflammation of their coats or substance, or the reverse. That there are diseases produced from a deranged state of them is as plain as a demonstration from reason can make it, such modified by the causes in operation, each producing distinct attacks, or a combination of symptoms peculiarly

their own : yet we cannot, on inspection, detect any thing like a lesion in their structure, merely from the circumstance that the operating cause destroys life ere this can take place. In such cases very many must have ocular demonstration for all the phenomena, before they admit the premises ; it may be observed as to this class, that the creed of their belief must be small indeed. Let us hear no more ranting or eajoling about the invisible nature of the actions of the nerves, but admit them at once as being those agents on which the production and operation of certain diseases depend ; but to our subject.

In Beriberri, we often have a most distressing dyspnoea, as might have been expected, where the disease progresses, and where the lungs are involved in consequence of an abstraction of part of their nervous power. Do we not meet with many cases of chronic cough, as depending on a deranged action of the nerves, which supply the muscles about the larynx. In this disease we have an effusion into the cellular substance of the respiratory apparatus, and the more the watery particles of the blood escape into their texture, the greater the difficulty of respiration. The state of the alimentary secretions is generally inactive and diminished,—the urine scanty, or not at all secreted. It is not surprising that these secretions should be imperfect, or suspended, for, as formerly observed in the investigation of cholera, where there is a considerable demand on the secretions of one part of the system, the others will be in a proportionate degree decreased ; here may be mentioned the striking peculiarity of the two diseases. In cholera, in consequence of the abstraction of the nervous influence from the blood, by being acted on in the manner stated, we have its fluid particles, or serum, let loose

in a great degree into the alimentary canal, whereas in this, it is believed, that the same takes place into the cellular tissue of the body, but in consequence of the smallness of the vessels this is less quickly done. Hence it follows that in the first exhaustion of the vital powers it should take place more speedily than in the last, since the whole circle in the chain of nervous communication is involved. The state of the skin, in each disease, is something characteristic of a similar operating cause,—it is cold and clammy in Cholera, in Beriberri although it is so to some extent yet there is nothing like the profusion of fluid which is poured out in the other. As to the state of the pulse little need be said, for, in comparing both diseases, we will find that the action of the heart is impaired according to the extent that it has been assailed by the oppressing action,—in this degree we find it varying in quickness, fulness, slowness, regularity, irregularity, &c.

In the more severe forms of the disease, we will find a more close approximation to the well marked symptoms of cholera as met with more particularly towards the close of the attack. There is much uneasiness about the region of the stomach, with a very severe thirst, an incessant vomiting, and we not unfrequently meet with severe spasms of the muscles. The extremities are cold, the countenance strongly Hypocratic, or of that livid leucophlegmatic appearance so well marked in the advanced stages of hydrothorax. Some may be inclined to say and justly, that we have many of the above symptoms present in other diseases besides these two, as well as from poisons,---why then are such not called varieties of cholera? My answer is that in all diseases in which we find many of these present, every one of them depends on a derangement of the nerves, but that

the exciting or operating cause in them is different from that which occurs in the contrasting complaints and in some cases of poisons. There are none which produce such a powerful tendency to a destruction of the blood, by the abstraction of its vitality, which resides in the nervous power, thereby causing a dismemberment of its particles. In Beriberri, and in Cholera it seems to be pre-eminently the case: we also know that some poisons have this peculiar property, when taken in large doses. Arsenic, for example, will induce many of the phenomena of cholera, even to the extent of the vomiting and purging of the same sort of matter;—but that such dejections resemble those of the more inveterate Indian epidemic, I have my doubts. The reason why all the symptoms are not present may be on account of the rapidity of its action, as also only involving a portion of the nervous system; hence we have a difference of power producing a difference of effect, not only on the nerves but the blood also. Accordingly we have an altered state of the blood from many causes, such as the duration of the operating power, the inveteracy of the symptoms, the magnitude of the exposure, with many other things to be taken into our serious consideration, each or all of the above producing a major or minor degree of the appearances met with; as each may act reciprocally, the one may be considered the parent of the other.

I look on Beriberri as depending on a particular disposition some how or other induced in the system by agents of a powerful nature, these in all probability the same with those of epidemic cholera. Such favoured by certain states of the body more or less favourable to the production of this particular malady. In pursuing the analogy of relationship, I observe that the constitutions which suffer most, are those of the habitual tippler,

the night reveller, or debauchee, in short all whose bodies have been impaired by other and various stimuli, whether this proceeds from long residence in an inter-tropical climate, or from excessive fatigue produced, by night and day watchings, particularly amongst soldiers in unhealthy and wet seasons of such places. Thus the nervous power being worn out, or much exhausted, causes a torpidity and flaccidity of the muscular powers, which is aided greatly by a bad or non-nutricious diet. The stout and robust are much less exposed to the ravages of each than those of the above description. The latter from long habitude are only capable of withstanding the stimulus of drink, this in a limited degree, they cannot bear that which is given by extra exercise either of the body or mind. This disease, as met with on the Island of Ceylon, is much more prevalent about the period of the changes of the monsoon, when the weather is variable from dry to wet, and at all times with much vapours in the atmosphere. The heat of the day being oppressive, produces a corresponding relaxation in the body, and renders it but ill adapted for withstanding the chilling cold of the evenings, which not unfrequently prevails at these periods. At other times the days and nights are so suffocatingly hot as to oblige the people to seek for relief either by a direct exposure to the night air, or cooling drinks, or both. Add to all this the noxious effluvia proceeding from various sources,—whether such be from an excess of vegetation, or from the putrid withered fruits, which are allowed to decay on the trees, or from the other prolific quarters, all of them contribute powerfully to the production and support of the disease. The manner in which these act, has been already fully considered, and it may again be stated that impressions made at the extremity of the nervous

system are at times rapidly communicated to the origin, here they may remain, and produce disease, or be transmitted to other parts, which, being disturbed and taking on action, send the impression of a different sort back again to the sensorium commune,—hence we have diseases varied in an extraordinary manner. Now the diseased action may proceed no farther than their origins, hence the spinal cord may suffer in some portion of it, and the impression remaining here, we may have a partial paralysis as the consequence ; it is therefore no difficult matter to explain the *waddling gait* which takes place, this from an affection principally of the lumbar nerves. It has also been noticed that the atmosphere can operate on the nervous extremities by entering the porous substance of the skin and other parts, independent of the lungs and stomach, thus the impressions may either remain and operate here, or be propagated to the general storehouse, from which all our actions emanate. That there is an action of this nature, or external respiration, we may as little hesitate to concede as that the operation of the atmosphere is necessary for the nourishment of the chick in ovo. We know that if an egg is completely gummed, the process of incubation will be stopped. So fish will die when the water in which they are is very closely surrounded with ice, for this also excludes the action of the air. So would man suffer most materially if he did not pay great attention to the state of his skin, for by allowing the filth to collect, he would thereby cause an impediment to free, and what, in colder regions, has been termed insensible perspiration. He suffers not only from this cause, but it is strongly suspected that much of this proceeds from the injurious effects, which such has in excluding, in a great degree, the action of the air, which

keeps up an external respiration compatible with the existence of the nervous twigs.

Let us now turn our attention to the appearances met with on dissection, here also will be found a few points of resemblance. In both, there is more or less venous congestion, not only in the vessels, but also in the larger viscera. In beriberri, as might have been expected, we will find a greater abundance than in cholera, as here we have a vast proportion of this fluid carried out of the body, through the alimentary canal, whereas in the former the blood is stagnating in the parts : such also will be found to be the case in the formidable epidemic in which there is but little vomiting or purging, for either in these cases, or in beriberri, there is certainly less of the vital fluid expended, than is to be met with in the severe forms of cholera, or even the sweating sickness. It has been stated that the alimentary canal is at times inflamed, this, however, as already noticed, is a very deceptive appearance, for, by pressing the parts gently, we can force out the blood which is the cause of this, when they assume their natural colour and texture. The most prominent feature, however, is the effusion into the cellular texture, this is to be met with at times distended in all parts of the body, particularly as shewn by the anasarcons sort of swelling of the under extremities, we meet fluid also in the ventricles of the brain, the lungs and pericardium, abdomen, &c. Such taking place in the short time that it often does, must have some general and powerful cause for its production. That this is in consequence of a disordered state of the nervous system will afterwards appear.

Such then, briefly considered, are the leading characteristic symptoms of the disease, without regard to order or even a general enumeration of them. The analogy

is considerable, and would appear more plain by a closer investigation of the subject. These, however, are passed over, and we now come to explain the manner in which the accumulation of watery fluids takes place in the cellular texture, and why it does so in such a short space of time, as to cause death in a few hours.

It is presumed every one will admit that the blood must be the fountain from which this supply is derived. But the manner in which such a rapid accumulation of fluid occurs has not as yet in so far as I am aware, been satisfactorily accounted for. In the prosecution of the enquiry I may be unsuccessful as others,—if so it will be a failure. We are well aware that cholera, in its more severe forms, is generally attended with vomiting and purging of a wheyish coloured fluid; the manner in which this is produced has already been, it is to be hoped, satisfactorily explained. The manner in which the production of the fluid, as well as the rapid prostration of strength takes place in this disease, may be accounted for in somewhat the following way. We are now well convinced that all those of a certain mode of life, the sedentary, debauched, and the like, whose nervous system is weakened, and in whom the actions of the body are greatly impaired, and those similarly situated, either from old age, or exposure to the influence of certain morbid materials, whether uniform or otherwise, are equally liable to an attack of this malady, as they are to cholera. The attack, however, is modified by certain circumstances, such as regards the strength of the system, either in its corporeal or mental capacity, in resisting the morbid principles. The disease in question then seems to be produced by, and depends on a diminution of the nervous power of a particular part, or of the whole of the nervous system, proceeding from the above

causes. In the first view of the case, we have that waddling gait, such arising from an affection of the lumbar nerves, or those of the lower portion of the spine ; from which circumstance the disease has received the appellation of Ceylon palsy. This diminution of nervous power may be looked on as arising in two ways, or in the end conjointly,—either the spinal canal itself may be the first part to feel forcibly the operation of the exciting cause, and dissection proves that, in some instances, this is the case, or secondly the extremity may be primarily the seat of the attack ; in this way the distemper is introduced, and the one part may affect the other. I consider the latter method the most frequent in which the disease is introduced and operates,—this from the greater extent of surface the morbid principle has to act on. The consequence of this loss of power or tone to the nerves, will be a deprivation of the main support of that stimulus, which the blood vessels and muscular parts have to continue their actions in due and efficient force, this is perhaps in a superior degree the case in respect of those parts more immediately near the surface ; in this last, as well as the farther the circulating medium is removed from the centre of action, so will there be a corresponding degree of inactivity manifested. This may hold good as respects the more internal parts, for we find that the nerves of the lungs are at times greatly under the influence of the oppressing cause, and are injured in somewhat the same way as those on the skin. Thus then the circulation not only becomes languid, but the blood vessels having lost much of their tone, will hence allow the more fluid particles of the blood to escape,—this too without a rupture of their coats, as we see not unfrequently in certain cases of epistaxis, and many other

complaints even of the hydropic order. From the great inactivity of the circulation, the blood becomes stagnating as it were in the blood vessels, consequently they are surcharged with fluid, which cannot be withdrawn in due time, ere many of its serous particles are given out. Hence the oozing out of the vessels,—it escapes amongst the cellular and muscular parts, (as into the parenchyma of the lungs, or the ventricles of the brain,) and into every part of the body subject to this derangement of action. These serous particles cannot be taken up in due time by the absorbents, for they also are now suffering from the same cause, being thereby *paralysed* in their actions much in the same manner as they suffer in cholera.

There are some questions I have little doubt but will be asked in this stage of the investigation. Why do not the same sort of watery depositions occur in cases of paralysis from injuries or other causes? Why does not this fluid, if deposited in the manner supposed, not run off by the bowels as in cholera, or by the kidneys as in diabetes? The first question may be answered by stating that in paralysis from injuries, it may be true that there is enough of the nervous power destroyed to impede the action of the parts, but then this only takes place in a partial, and not a general manner, for the whole nervous action is not destroyed or greatly oppressed. Besides, the nerves of motion may only be injured, yet there are sufficient branches from other sources left untouched, which will continue to supply, as far as they can, *vitality* to the parts, this, although in a minor degree, is sufficient to keep up the action in the vessels so as to prevent exudation, to the extent met with in Berriberri. When, however, a *general* paralysis of the lower extremities has occurred, and continued for a

short time, we all know there is not only a gradual wasting of the limbs, but that there is also a strong tendency to large anasarcaous swellings of the legs, and do what we please, especially in elderly people, we cannot remedy the evil in toto—thus shewing a torpidity of the muscles, and blood vessels, all occasioned by an abstraction of the nervous power. The difference then consists in this, that in the one case there is sufficient nervous power left for carrying on the vitality or life, although attended by a deficiency of motion; the longer it continues the more severe it becomes, and, as a matter of course, the greater the extent of lesion to the nervous stimulus, the more and more varied are the symptoms. But, in beriberi, the whole of the nervous power in the extreme parts, as well perhaps as in a great measure at their origin, seems to be powerfully oppressed from the very first, by being acted on by the morbid poisonous principle so often alluded to. The second question has been in a great measure answered, by taking into account the inactive state of the absorbents, as well as the partial paralysed state of the nervous power in diabetes; here, however, there is a greater depression of it, so that the kidneys come to suffer in conjunction with the other viscera. The inactivity of the absorbents and veins, which may be supposed, in ordinary circumstances, capable of taking up the superabundant quantities of fluid deposits, also suffer from the same cause. Even granting that this fluid were partially taken up, yet the inactive state of the circulation would prevent its getting so quickly out of the system as it would otherwise do. As to the fluid not running off by the intestinal canal, as in a diarrhæa, or cholera, has been already in part answered by supposing that the resisting power here is stronger than it is on the surface, else we

should have something like a dysentery of a certain stamp. The disease, therefore, from certain peculiarities we are not exactly acquainted with, seems more disposed to confine itself to the parts primarily attacked. When it commits more extensive inroads on the body, the supply is furnished of sufficient force to defend the bowels well, hence they escape until the disease is so far advanced as to bid defiance to all remedial measures, the parts that suffer most are those the farthest removed from the centre of the circulation. But many may think that this is not saying enough, since we are aware that the sanguineous system of the viscera is most extensive ; dissections prove it to be loaded or gorged with blood,—congestions here then should be more apt to be thrown off by the intestines, than by the other parts. This might be true were they the suffering portions, but the distemper is of a less aggravated nature than cholera, to be injured in this manner, it may also be stated that no two such active operations ever take place in the body at one and the same time. That which is first introduced will predominate, as happens in this instance, and will continue in operation either until the system, aided by our remedies, is enabled to re-act with sufficient permanency, or until death ends the conflict. From what has been advanced, we may easily account for the rapid accumulation of blood in the more internal parts, as well as the manner in which the fluids are poured out into the cellular texture, as also the rapid and general prostration of strength which usually occurs during the progress of the disorder. We need not therefore be astonished that there should be a palsied state of the system, when we consider the great abstraction of its nervous power. Thus I have very briefly attempted

to account for the various phenomena of Berriberri, the manner in which it is occasioned, as well as its various symptoms. and also entered into a few other points connected with the subject. In fine, then the two diseases may be classed under the same genus, only with this difference that the one shews its ravages on the alimentary canal. and the other on the more external parts,—as the cellular membrane and parenchyma of the lungs.

CHAP. II.

TREATMENT.

We may now turn our attention to the treatment, and it will be found that we have been equally unsuccessful here, as in cholera, I mean as respects the severe or malignant attacks ; in the prosecution of the subject I shall be as concise as circumstances will permit. The first point demanding attention is that of blood-letting.

BLOOD-LETING.—This, as a remedy, has been approved of by some, and condemned by others, it would be a wonder indeed if it has escaped such treatment as it has met with in every other disease in which it has been recommended. The cause of this discrepancy of opinion may at once be accounted for by taking into consideration the different states of the constitution attacked, as well as the duration of time, the patient has been under its influence. If my views are well founded, our practice in this respect may be soon determined, as there is a congested state of viscera with turgescence of the blood-

vessels, we might, in accordance with the views of some, not do wrong by removing, at any time, a certain proportion of blood; by which means we may turn the tide of affairs, and, by withdrawing the blood from the surface, prevent the effusion of more fluid. But, as the skin is cold, many will say that there is no blood circulating here, and a loss of almost all action in the absorbents of these parts—consequently there can be no fluid given out to the cellular texture. In this disease, we will find that the powers of the circulation are not exactly so much oppressed as in cholera, and that there is always more circulating,—thus it will permeate the vessels, and, small as the quantum is, there is a sufficiency for the supply of that which is found on inspection,—this is another fatal drain on the vital fluid. By bleeding early we may, in a great measure, prevent this from taking place, but the practice will be of but little benefit in the after stages, since here it is much the same as in cholera, we want a power or powers sufficient to put it in motion, as well as to keep up the action of the nervous system. So that, if there is any chance of doing good, we must use it at the very moment of the formation of the attack, or very soon after, because, if it is delayed until the distemper has made some progress, we will find that we only do harm. We can easily perceive why blood-letting should relieve the severe dyspnœa, for, by taking off the congestion of the system generally, it will also restore the balance of the circulation in part only, and, as a matter of course, the lungs will receive their quota of benefit. Phlebotomising largely in beriberri would prove very injurious, not only by a too great abstraction from the circulating medium, but also from the general debility thereby induced; we have very frequently too much of this to

contend with in those, who are victims of the malady, so that in the end, if perchance we succeed in producing re-action, we will have severe difficulties to encounter. Small bleedings will be useful as a means of *relieving* the breathing, but with no other view can it be safely practised. The person who lays down rules for blood-letting, especially in a hot climate, can know but very little of the grand principles of his profession; it is not by abstracting a stated number of ounces that we can gain our ends; such therefore is not attempted, but a general rule for our guidance, is all that can be consistently pointed out. I would, however, in the milder forms of this complaint, prefer the moderate abstraction of the vital fluid, and should the dyspnœa return we can again repeat it. By following the opposite plan, and bleeding largely at first, we may do irreparable injury, since the patients attacked are of that description who stand the effects of the operation badly,—being debauchees, or those in whom a manifest degree of debility has been previously in existence. It may be asked why not bleed largely at first so as to remove or prevent the venous congestion? In answer to this it may be stated that, in diseases of this nature, bleeding under such circumstances so far from removing, only produces in the body a greater tendency to it, by inducing a greater degree of torpidity and debility in the whole and strongly predisposing to the greater accumulation of blood in the more internal parts; it thus throws a load on the actions of the heart which must prove highly oppressive. This is not the only evil attending such practice,—we will find that there is also a *relaxation* of the blood vessels very apt to occur, for their *tone* must be reduced, and thus an encouragement is afforded in the after stages to a more speedy and effectual collection of fluid. I

may refer to what has been advanced on this subject on cholera, where the views advocated will be found equally applicable here.

Without observing any distinct arrangement in the enumeration of the various medicines, I shall rather attend to the general indications required, and therefore proceed by saying that the most feasible plan of procedure seems to be to rouse and strengthen the system. Blood-letting, when very early employed, *may*, by taking off the onus of venous congestion, accomplish in part the first intention, but this only in certain cases. Our indications of cure therefore are to set the nervous power in action,—to endeavour to cause the effused fluid to be absorbed, and, by supporting the bodily powers, prevent such a tendency. The means for effecting these indications are such as we find of considerable efficacy in drop-sical complaints when attended with much debility. In the more mild forms of the disease the nervous power may, in some measure, be roused by stimulants and stimulating embrocations, and these may be joined at times with certain sedative medicines, according to the urgency of the symptoms and the judgment of the prescriber, care being taken that we do not use the latter in too great abundance, as we would thus only lull the action we are attempting to establish—the following may be a good embrocation.

℞ Spr. camphor—℥ss.

Tk. cantharides—℥iij.

Lig. ammon. pural—℥ss.

Liniment. saponis—℥viiij. m. et. fl.

Liniment. If there be severe cramps with great pain then we may add sulphuric æther ℥vj and Tk. opii ℥iij. This as an entire liniment will be found highly useful in rhumatic attacks, after the more acute symp-

toms have been subdued. Mustard powder rubbed over the extremities will be found also of great utility. Sinapisms applied to different parts will also prove of much use, in particular over the region of the stomach, especially when there is considerable irritability of this viscus; or the same sort of applications to the nape of the neck, or down along the course of the spine, either for the relief of the part or for the subduction of general irritability. A blister, applied to the lumbar region, the moment the patient is attacked, will also prove of great service and should never be omitted. If a hot bath is thought proper this should be a medicated one, (the nitro-muriatic acid,) and this pretty strong. Such a remedy however is better applied by sponging the body, for thus we do not disturb the patient so much, nor run the risk of damaging the system by the depressing power of the heat. In short, any of the mineral acids will do for sponging, and should never be omitted; since no other remedy has such powers on the nervous action of the whole surface.

For internal exhibition, we have various cordials and stimulants, with the view of rousing the system, and supporting the strength, are they to be had recourse to? To encourage the action of the absorbents we may find the following exceedingly useful not only in this disease but in most forms of dropsy.

Sulphat. quinin. 3ss.

R Super. tart. potass. ounces ss.

Oxymel scillæ. 3iij.

Pulv. digital. gr. vj.

Sub. mur. Hydr. gr. x.

Syrup g. s. ut ft linitus—3ij.

This taken, in divided doses, during the first twelve hours: the digitalis ought to be new and good, or we can use the squills in place of the oxymel, this is to be repeated

and continued as long as may be thought proper. Gin, or Hollands, we will find a useful auxiliary, not only as a stimulant, but also from its tendency of stimulating the urinary organs. Other remedies, as a matter of course, must be employed with the above. The bowels, from their general torpid state, require considerable attention, and we should employ such remedies as are capable of not only procuring a stool for the time being, but also for inducing a healthy state of all the secretions. Calomel then is most usefully combined with all purgatives,—care being observed to avoid the more drastic. By this means we take off a load from the circulation, and produce a sort of reaction in the body.

We will find, in many cases, particularly those of a more formidable aspect, a great tendency to general debility, with oppression at the præcordia. It will be well to bear in mind that, under all circumstances, we should choose those remedies which we know are possessed of strengthening and nourishing qualities, and leave behind them a tendency for this being kept up. These will more effectually relieve the difficulty of breathing than many other remedies, as here this symptom depends greatly on debility of the lungs. If Gin is not powerful enough for supporting the strength, then good brandy may be used, or wine, according to the option of the practitioner, or as the severity of the symptoms seems to demand. I have already noticed that, in the exhibition of stimulants, we must watch with unwearyed attention their effects, so that we may derive, from their administration, all the advantages they are so well calculated to give. Care must be taken not to allow their sedative properties to occur in too great a degree, or that they should, from mal-administration, produce an excess of stimulation. Other remedies we

have for the amelioration of symptoms, such as attending to the functions of the skin; it is thought that Dovers powder will be very serviceable, not only in producing a tendency to diaphoresis, but also in allaying the irritability of stomach. The thirst is to be quenched by medicated drinks, to which some supertartrate of potass has been added, these, as well as other important matters, have been fully detailed in the treatment of Cholera. In the more mild forms of the disease, it will be found that these measures will frequently answer, but in the more severe, much attention is required since they run their course rapidly. We will find a blister applied to several parts of the body peculiarly useful, in not only keeping up the action of the system, but in allaying irritability of stomach; as a blister is long in producing its full effects, we will find the means formerly noticed as to nitric acid, used as a blister, of great service here also. If by these measures, which I believe to be the best that we can use, we succeed in arresting the progress of the complaint, and thus bring the patient from immediate danger, we will find that there is very great debility, as also a weakness and numbness of the lower extremities. In order to counteract these a useful medicine is quinine and wine, used from the very period re-action has occurred. Stimulating embrocations may still be used for giving tone to the muscular parts, as these sensations depend as much on weakness or torpidity of the muscles as any thing else.

In the more severe forms of the disease, even by the earliest interference we will have great difficulty in saving our patients, the hot bath with the strongest anti-spasmodics, will prove of no avail, for, like Cholera, it runs through its several stages with rapidity giving but little time for the effective operation of any medicine, since the

powers of the system seem to have had their death blow from the very first. The absorbent system, as well as every other part, is completely paralysed so that stimulants or sedatives have but little action even on the stomach itself, if they have, particularly the latter, it is more of a local than a general action. Our main object then is from the first to support the strength and falling powers, and if by the judicious administration of stimulants we can once get an action set agoing, care must be observed not to allow it to flag. Neither bleeding, nor the hot bath, should I prefer as likely to do any good, for these only tend to produce a greater degree of relaxation and torpor of the animal and vital powers. As to the hot bath, under the circumstances supposed, giving heat to the system, this is looked on as a mere delusion, it will certainly give artificial heat, but then this, in place of being useful, is positively destructive, for it now powerfully oppresses the general powers of the body, and we will find that death sometimes speedily occurs when the patient is taken out of it. With regard to the exhibition of calomel, we cannot select a more useful medicine for the ultimate restoration of the system. Opium should never be added, as this will depress too much those powers in being, but some other sedative of less injurious qualities should be selected. If, however, opium is judged indispensable, then the fluid is to be preferred to the solid form, for reasons already given. Calomel should be given from the very first in all cases, provided there is nothing to prevent its administration, in the doses of from fifteen to twenty grains, this repeated three or four times during the first twelve or sixteen hours. We ought therefore never to rest satisfied until three or four of the scruple doses be administered. Those who fear a ptyalism dread a mere bug bear, a thing more

ideal than otherwise, and it will be in smaller doses very properly combined with quinine. If such should come on, and this soon, I would be exceedingly well pleased, as from this circumstance, we may be well assured that the action of the system generally, is either going on well, or about to do so. Great care must be observed that our patient does not suffer a relapse from negligence, which will arise in this as readily as in Cholera. As to Diet the most nutritious and easily digestible should be selected, and a liberal allowance of wine may be highly proper until our patient's recovery.

Such briefly stated appear to be the leading points of the treatment. I refer to other works for a more complete history of the disease, my object being only to point out the peculiarities of the complaint, as to what may be fairly considered the grand causes, and also the class of remedies which should be preferred as the most applicable for the treatment. Suffice it to say that, from the above observations, as well as what has been detailed under Cholera, we will seldom fail in saving those lives which are to be benefited by the use of medicine, and it is to be hoped that a considerable analogy has been traced between the two.

Previous to leaving the subject, let us turn our attention for a short time to another point. I have no doubt but the question will be asked, why Beriberri does not shew itself in all places where Cholera has been prevalent, if it be only a variety of the latter, or why it seems to confine its ravages to Ceylon, cases of it are met with in the present day amongst the Natives in certain parts of the Island; or why it has not penetrated further than the neighbouring coasts, and even here not to be met with above one hundred miles in the interior, or why it does not extend above that distance to sea.

Some may consider these questions sufficient to refute the opinions advanced as to its being dependent on the same cause for its production, as Cholera, since, were it so, it ought certainly to have been present in every quarter, in which the latter has been prevalent. The difficulty of accounting for such, is only so in appearance, as we know that particular diseases spring up, and confine themselves to different climates, and do not spread their ravages over the whole world. Why, it may be asked, do we not find every species of the same genus of plants growing in the same or different lands, and these exactly placed as regards climate, and I might add soil? There are diseases possessed of such a peculiarity, and certain of them will be found to prevail in one portion of the globe, while others are to be met with in other quarters. The fir and the oak, of our own country, can only grow in certain latitudes, and in these they do not always arrive at that majestic form which they exhibit in their native soil,—so it may be the case with Berriberri. It has been stated that in Cholera the whole of the nervous power seems to be oppressed,—in particular that of the alimentary canal; as the disease progresses, it necessarily commits further deprivations on the system, by weakening its functions, as also by producing a change of the blood, and rendering it in a fit state to run off in the manner stated. In berriberri, the nervous functions of the skin are those chiefly attacked, and they operate in the same way; as the disease gains on the body, so do the other parts become oppressed. The intestines resist the action for various reasons; one principal cause of this is that their great ganglionic system of nerves aids most materially in defending them from such an assault. It is more than probable that the functions of the surface are more easily assailed, from the fact that

those who suffer are, generally speaking, characters, who have a sort of forced existence, living chiefly on stimuli of the spirituous order, and especially arrack, which I do sincerely believe when new, to be powerfully destructive to the nerves. Their diet consists chiefly of fish and curries,—the fish being not unfrequently out of season, or not in the best state of preservation. Their life being generally inactive, renders them but ill calculated for the more active duties of the sailor or soldier. That there is also a peculiarity produced in the human body, by a long residence, or even a limited existence in a hot climate, few will dispute. Man, although the monarch of all animals, and capable of bearing transplantation from one soil to another yet even he is far from being triumphant, as he is, in a great measure, governed by the same general laws, and we know that he cannot in many instances, any more than they, bear transplantation from his native soil with impunity. That there are numbers who live in such climates is perhaps not to be wondered at, since he of all others is better adapted from tuition alone for enduring such changes. That there are many; however, who fall victims to such a change need not surprise us. Of the vast numbers who yearly go to India, and our other colonies, within the tropics, how few return, or live after a period of a few years exposure. Those who are intimately acquainted with a soldier's or sailor's life may answer the above with a melancholy affirmative. Africans, especially when young, as well as some others ill bear the rigours of an English winter, nor can Europeans live long, or more than a few years in several parts of Africa. The longer in an intertropical climate otherwise free from epidemics, the more naturalised do our bodies become, but this only holds for perhaps the limited period of from fifteen to twenty years, when the body

again begins to feel the effects of the climate. We now require a change to a more temperate, by which we may gain an acquisition of strength. That there are a few who live longer in these regions cannot be doubted, but then such may be certainly called *escapes* rather than a general result, or any thing like it. That there is a peculiarity in Ceylon, as to temperature, and other points I think cannot be doubted, and that such gives rise to a particular form of disease, equally few will hesitate to admit, and that this may exist within the sphere of its action extending for many miles upon the adjacent coasts some will admit,—thus the disease *berriberri* may be produced. But the influence of this or that cause has not been so extensively felt as in the case of Cholera, even in those parts. This peculiarity is evidently shewn by the fact, that it requires some months' residence, ere we are exposed to the ravages of the disease, and although the complaint seemed at first to be indigenous, yet we know it to be not exclusively so, since we meet with instances of it along the adjacent shores, and perhaps, like Cholera, it may soon spread to other parts. Civilised life introduces many varieties of disease, and the changes which the world is yearly undergoing add greatly to our lists, and may, in some measure, account for the greater frequency of epidemics now a days than used to be formerly. One cause at least of our very limited existence, with the production, or liability to a host of diseases, may be ascribed, in a great measure, to our *potent* potions, and a change of diet, for that which is not sufficiently nutritious, which has been introduced by civilised society. Our antedeluvian forefathers lived to the age of eight or nine centuries, but the life of man has changed since then, and we hurry it still faster to the grave, than is the limited lot of a few, who have their three score years and

ten. The antedeluvian drink was our progenitors' potations, but we, in order to add to *our comforts*, must have something in addition. Let man be once accustomed to the *precious* fluids, and he cannot do without them. In that period of lengthened life, what a chance for the prosecution of scientific subjects. Under such a state of affairs, we should have had none of the bickerings or caballings of men, as to the peculiar nature of this or that disease, as all these things would have been settled. But it is well that something has been left us to occupy our minds, and thus not only to afford instruction but to add greatly to the enjoyments of life.

CHAP. III.

DIET AS CONNECTED WITH THE PRODUCTION OF EPIDEMIC DISEASES.

It now remains to enquire into the reason, why Europeans, as well as others, should be so liable to endemic and epidemic diseases, more particularly why they should be so subject to cholera. In the prosecution of this important subject, I shall proceed in as concise a manner as possible, and it is admitted that it will not have that justice done, to which the merits of the case so fully entitle it. It will be well, at the very onset, to bear in mind the very injurious and baneful effects of spirituous liquors on the human constitution, especially in inter-tropical climates. I do not mean to go the length that some do, by advocating a total abstinence from some stimuli of the sort, but let every one be strongly aware of the noxious qualities of these when taken in excess, as well as the diseases which are apt to assail not only the habitual tippler, but also those who *occasionally* commit a debauch. The debauchee will suffer in most instances, during the prevalence of an epidemic, from

the fact of his broken down state of body and mind. The other may be liable to suffer, at such times, from the circumstances of his bodily powers being weak after drinking. There are other depressing causes attending revelries besides those of the bottle, which ought to be carefully avoided, these as they are but too apparent, require no amplification. Whatever then tends to depress the powers of the body, either in a major or minor degree, will, to the same extent, operate towards the destruction of the generating principle, in whatever this consists; no matter whether it is in one, or a multiplicity of actions, the climate itself is a cause in constant operation, for the heat acts not only as a general stimulant, but also, by its constant operation, will ultimately exhaust the whole bodily power. In India, the short respite of two or three months cool weather, with the thermometer generally above 70°, is too short a period for having them properly recruited. The over-powering cause again coming into operation, must act in a wonderful manner towards the production of general debility, a state of the body at all times the most favourable for imbibing the causes of disease. When, to this general stimulus, we add that produced by an excess of either vinous or spirituous indulgencies, we can easily perceive why the evil may be apt to assail us doubly quick. This applies also in some measure to such as "fare sumptuously every day," but how much more injurious must this be to those to whom the necessities of life are denied, or but scantily supplied, in any clime, particularly in the east. It is not, according to the quantum of this or that diet taken, but the question is as to the nutriment which is capable of being supplied to the body. I know, and admit that quantity has a good deal to do with the digestive powers, and could

illustrate this point with many examples, were it at all necessary. The powers of the digestive organs must also be taken into account, and what they are capable of assimilating, in this their weakened condition,—here I speak particularly as regards vegetable diet.

The question then may be, can the European, or Natives of India, receive a proper supply of nutriment from this alone? It is believed from a first view of the case, that in India, that they cannot do so. This is pretty correct, it is not intended to be stated that in some other climates this may not be the case in a great degree, for here the Natives can have recourse to a variety of vegetable substances of perhaps a superior quality. But, in India, the case is widely different, and why? merely from the debilitating nature of the climate, and the badness of many of these substances. Any one who follows *closely* the Native mode of living, as it *ought* to be, according to their religious tenets, it is thought would do himself very much damage. Those who have suffered most from the ravages of Cholera, are certainly the Indians, as the disease has carried off many millions, with not a few of our troops, this too in almost every corner of these extensive dominions; but more particularly along the Malabar and Coromandel Coasts, this from the circumstance of a greater change between the sensible temperature of the days and nights, than is to be met with more inland; this subjection to the disease is perhaps also owing to a superabundant population, with the thick impenetrable woods, marshes, and other deliterious substances met with here. As the lower classes of Indians form the greatest number of yearly victims to the distemper, it may not be improper to examine a little into their manner of life.

From the nature of the climate, Europeans, and all

are obliged to dress in very light clothing. The class of Natives referred to, are not by any means well supplied with this sort of protection. We do well to wear the light clothing in so far as the day time is concerned, but if at night it should rain, or a sudden change of temperature take place, we would find this a sorry protection against the chilling effects thereby produced. It is therefore highly proper that our men should have another sort of protection for their bodies at night, than they wear during the day, especially about the period when epidemics are likely to occur. Most of the poorer classes of Natives may be seen lying down at night, (here I speak of Bombay, and Madras,) in the very same dress they wore during the day, and this too in the open air; they, however, take one precaution which Europeans do not sufficiently attend to, and this is the protection of their bowels, by wrapping their long band of cloth which forms the head dress round the belly, and leaving the head slightly protected or bare; during sleep, the body is more liable to be attacked by the noxious exhalations carried about in the air than it is while awake. Here then is one great cause of their liability to fevers, dysenteries, cholera, or other diseases, and the European not being accustomed from his earliest years to such a mode of life must, at these particular periods of the year referred to, suffer also, even independently of his strong constitution. He is more liable to this from the stimulating effects of the daily heat producing a relaxation of his body than perhaps the Native; during night at times the perspiration runs from the surface in every quarter, consequently if at any time the temperature suddenly changes he must be liable to be assailed. In this manner then, by being exposed to the night dews, rains, &c. their bodies are rendered in a high degree susceptible

of contracting complaints, in particular those which operate on the nervous system.

Another equally important object of attention is the diet. It may be true that a European may do very well by following the Indian customs in this respect, for a short time at first, that is taking a good proportion of vegetable diet. After he has become, in a great degree, inured to the climate, he will find that although the rice curries with fish or fowls, however palatable are by no means proper, since they do not, in general, afford a sufficiency of sustenance to the system. Such a diet may without any impropriety be compared to Hospital Half-diet, which is not by any means well calculated for an European constitution in health. I do not argue in favour of the gourmand, or epicurean side of the question, either extreme is to be avoided. But I say let the European soldier or sailor *continue to take that proportion of animal and vegetable diet to which he has been accustomed, with his daily allowance of spirits*, but no more of the latter, else the consequences will be a speedy falling off in the powers of the body. Do not let us observe our men any longer deviating from the good old *substantial* fare to which they have been accustomed, and I will be borne out in the opinion that we shall meet with fewer cholera cases amongst our troops in India, than the present returns shew, not only so but also a greater immunity from epidemic diseases of all sorts. Rice is certainly a most important vegetable production, and may certainly be substituted in lieu of other vegetables, but let there also be a proper proportion of *animal* diet, else we may find that there will soon be a manifest defect. The Indian fare may be considered almost exclusively as vegetable, and this at times, composed of substances, none of the most nutritious. Give an Indian

rice, curry powder, a little salt, and some other vegetable substance, with the means of cooking this, and he is satisfied. This will not do with the European, for his constitution has been differently moulded from the first, and requires something more nourishing. We are pretty well aware that if an animal be fed on one particular species of food, and this, even of the most nutritious sort, for a length of time, he will be as effectually starved as if he had had nothing to eat, although there be a superabundance of the most nutritious substance supplied to his stomach. He will either die then, or we will find him becoming thin and meagre, with sores breaking out in several parts of his body,—at length he dies exhausted. Rice therefore, although aided much by the cooking, is not of itself a proper article of diet : it may be rendered more palatable, and stimulating by the curry powder, yet this last through time gradually weakens the digestive apparatus from the daily stimulus it induces, hence we have that laxity of fibre so distinctly marked throughout the whole frame of the lower classes of Indians, and the tone being lost, renders the body particularly obnoxious to disease. Rice is not the only species of vegetables they use, it is, however, the chief, the others being crude and watery, are but ill qualified for sustaining the healthy functions of the body. These, when added to the woefully hot state of the climate, must be detrimental in the extreme, and, although many might consider a vegetable diet under such circumstances the preferable, yet I cannot agree with them, for certainly such would be much the better to be joined with something more than the scanty allowance of fowls or fish which they can obtain.

It may be answered, that slender as Indians are, they are better able to bear fatigue than Europeans, even

to perform more arduous duties, this, many besides myself, however, will not be inclined to admit. Yet who could be expected to bear the effects of a burning climate better than those who are born under its sun, a European, after he becomes, a little seasoned, will also be able to bear his quota of fatigue, and will certainly be much better adapted for arduous undertakings than the Natives. Europeans, then, living after the manner of such people, must, in time, have their bodies much impaired, and possess much of the Indian stamina. Thus their bodies being rendered weak and infirm, they become but ill qualified for resisting the attacks of malignant disease, since a general habit of indolence is thereby produced. Let us look for a moment to another class of men—the Natives of Madagascar, particularly along the sea coasts. Here any one must be struck with the great contrast that exists between the natives of these two portions of the globe, these men are well built, stout, and muscular. I was certainly much surprised with their general appearance, being so different from that of the Indians. Now Madagascar, if not so hot, yet does not fall far short of the temperature of India, and although the Malagases live much on rice, yet they do not exclusively do so, having *no particular aversion* to a piece of bullock's flesh, every now and then,—of which there is a great abundance on the Island. They partake of this, therefore, not as a *dainty*, and but seldom to be tasted, but, make it almost a daily article in their bill of fare. The consequence is that their bodies are robust, compact, and athletic, and are therefore better able to resist the effects of the climate. The coasts of this Island, at particular places, are well known to be very unhealthy, and the French men-of-war that were there, as late as 1830, can bear me out as to the truth of this. It

would be loss of time to state any thing more than that the race of mortals who partake of a vegetable and animal diet, are more capable of undergoing bodily fatigue than their opposite neighbours. There is, even in the bodily powers of the Natives of Great Britain, some difference, when compared with those European states farther to the southward. I know well that some will say that a vegetable diet exclusively, is not improper for the support and improvement of man. Look at the Natives of the south sea Islands, they are stout and strong, and live on vegetables. This I admit, but then it is easily accounted for by the difference of climate as well as their generally having a part of animal diet, and none of the curries so much used in India, which in time is a great degree destroys the digestive powers. This point could be well illustrated by referring to the animal creation, for this, however, there is no necessity, since examples must be familiar to every one. The savage would be but ill qualified for the chase, if he confined himself solely to vegetables. In fact, the very circumstance of his proceeding such with animals, shows how well he is immediately acquainted with the merits of the species of food. If antiquity were to add strength to the argument, all that require to be done is to bring down the statement that this mode of life has been followed by all nations from the days of " Nimrod a mighty hunter," and the Patriarchal age to the present time. A celebrated traveller, when in Africa, was entertained by the natives saying " of the white man who came out of the water to live among the Kooranko people the white man ate nothing but fish, when he lived in the water and that was the cause of his being so thin. If he came among black men he would get fat, for they would give him corn, goats and sheep to eat;

“and his thirst should be quenched with draughts of
“milk.”

From what has been advanced, we may safely conclude, that a diet, almost exclusively vegetable, is not the most proper for man's existence, especially in a hot climate. When the fine arts flourished in the East, many centuries ago, I verily believe that such a mode of living was not then so much in vogue as now. Some may be inclined to go a step farther, and attribute this decay, not only to a change some how or other effected by their religion, producing thereby the attending results, and that the sciences, or fine arts, will never again come to that perfection, in which they must have been some centuries back, if we are to judge of this from the relicts which are to be met with in many parts of the Eastern world. Man, when compelled to live on on this fare either from religious scruples, or necessity, has his body and mind devoid of that majestic symmetry, which it would assume, as is evinced by those who live on the opposite. Their mental faculties are by no means so bright and commanding as those of their opponents, their animal courage, slight, and a host of other items, all rendering their bodies less able to undergo fatigue, and consequently more prone to disease, and, in particular, to endemics and epidemics. Their opposite neighbours, however, are much more liable to another class of distempers. I leave this point to be settled by the medical men of India, whether they would treat inflammatory diseases of the whole class, this with more confidence of success than those to be met with in the vegetable tribe of mankind such as cholera, dysenteries, yellow fever, intermittents, plague, &c. The wise medical man would certainly prefer those diseases in which there is some time and latitude for his practice, and in which

the system has stamina requiring to be brought down, than he would choose to treat epidemic diseases occurring in the vegetable tribe, in which he requires all his energies to bring it *up*, so as to enable it to encounter the severe shock received.

If the above observations be correct, and they have been stated in a very general way, many very important deductions may be drawn. If a body of men, we shall suppose European soldiers, be allowed to live as they choose, or according to the Native mode, chiefly on rice and fish curries, for a length of time, what may be expected when a powerful epidemic comes across their path? Why the result is as might have been expected. It must be evident that their bodies are much enfeebled; although they may have all the external signs of stout healthy men, yet they are only *apparently* so. The fish, as an article of diet, in many places of India, is very bad at certain seasons, when so, it is particularly injurious. The cholera, during this unhealthy season, is particularly prevalent at Calcuta, when we find the Hooghly swarming with myriads of this description. The natives, although strongly suspecting this as a predisposing cause, yet continue to eat it, for very good reasons, that they must either choose to run the chance of being poisoned, or starve, and their cheapness is certainly a great inducement for their extensive consumption, the consequence is that vast numbers of the Natives are attacked, nay, in some instances, immediately after eating them especially at night, when they may have remained from the dinner hour. To return, however, to our Europeans living after this manner, the money they obtain, in lieu of their regular allowance of provisions, is more than adequate to furnish them with curries and the like. Hence the surplus money they

generally spend in drink, thus adding one evil to another ; the stimulus from both quarters tends, in a powerful degree, to the relaxation of their bodily powers, this, when added to the pernicious tendency of the climate, must prove in no small degree injurious. If, under these circumstances, such a body of men is called upon to perform any arduous duty, and is sometime exposed to wet weather, or the chilling blasts of the night air, their bodies will be particularly susceptible of epidemic disease, and if cholera should be the prevailing one, we shall have a woeful bill of mortality, many thus falling victims to an irregularity of diet. It is now too late to change this, but the old adage of *sero quam nunquam* should be remembered. The above is not altogether a visionary view of the case; if we were to search minutely, we might find some instances particularly illustrative of the injurious consequences attending this sort of life, and where the mortality may be expected to be great. Let any one, acquainted with India, pause for a moment, and consider the vast number of European troops that are yearly cut off by endemic and epidemic diseases, even on their marching expeditions, and attempt to trace the cause ; he may be induced to believe that this, at least, in some measure, depends on the causes now brought forward. Let us, therefore, not follow too closely the manner of Indian diet; there is one point, however, we may with safety imitate without any dread of the consequences, and it is the *sobriety* of habits as inculcated by their religious *tenets*. I would, however, say, do not deprive our men of their daily quota of spirits ; but further than this they ought not to go. By a careful attention to these points, as also that the men are commodiously lodged, and not too much exposed to the chilling effects of the night air, we may, and must

save many valuable lives, and have men, at all times, fit for any undertaking.

Many, I have no doubt, will attempt to subvert these views, by stating, and it is a fact, that the stoutest, as well as the weakest, are liable to the attacks of cholera, nay, such occurring at the very breaking out of the epidemic. To this, it may be answered, that all are no doubt liable; but it cannot be admitted that all equally suffer. How much more seldom do we find this the case in the stout and robust, than is to be met with in the weak and infirm; every day's experience proves the fact, that the debilitated and ill fed portion of all communities suffer the most, and are generally the very worst, or perhaps, in some instances, the only sufferers. How is it that so many officers escape during the raging of the disease, as such may be truly called *escapes*, especially amongst the medical corps. I should say that this is chiefly owing to their regular life, and greater sobriety of habits. When the stout, and apparently healthy man, is attacked, the chances are that he has been either living in the manner supposed, or been committing an occasional debauch, which, in many instances, is much more prejudicial to them than it would be to the regular debauchee, or to themselves, if they had continued under stimulus for some time, and gradually modified its effects. This is a point to be particularly attended to, for if we allow the man who has been but little accustomed to spirits in a hot country to become sober, as it were, all at once, or rather to leave off the grog suddenly, he may thus be thrown into a fever, or any other attack of disease which might have been perhaps, in a great measure, prevented, by the gradual abstraction of the stimulus, this requires no illustration to the habitual tippler. By this means

we would either break the balance of the system at once, or restore this to the proper point of healthy action, in place then of having a headache, or a tendency to repletion, under these circumstances, we keep up a sort of equilibrium, not only of the circulation, but of the general system, and thus prevent any determination to particular organs. Very great discrimination, however, is required to manage cases of this nature, for, if there were a strong appearance of inflammatory action, none would be so foolish as to adopt the plan. There is another danger,—if we bleed much, we may throw our patient into a fever also ; there, then is for our proper guidance, in such cases, only to *moderate* action, and not depress too much the native strength. Now I say that if the stout man has either been indulging in an occasional debauch, or is labouring under mental despondency at the time, or under other causes producing debility of the animal and vital powers, he is as liable to an attack as those of a less firm material of body. It is not attempted to be stated that a sober, sedate, stout man, may not be attacked, but how seldom is this the case compared with its occurrence under opposite states of body.

Thus I have attempted, in a very concise manner, but compatible with the importance of the subject, to point out the reason why cholera and other epidemic diseases should be necessarily more prevalent in India, as well as why they are in general so fatal. If I have avoided entering more fully upon the effects of climate, this must not be attributed to a conviction of the non-importance of the subject which, as every one is well aware, demands the serious consideration of every medical man. The effects of climate have been treated by other medical writers, but those of diet on a grand scale have

not, in my humble opinion, been sufficiently inculcated. Do not, by any means, imagine that I would compare the dieting of any class of men to that of animals, although much might be learned from this broad hint. That diet, and particular sorts it, are alone the means by which we are capable of maintaining a just and due state of healthy action of the powers of the body, cannot be doubted. It will also appear, from what has been stated, why the poorer classes of society, in every state, should be more frequently the victims of disease than the better classes of the community. The body, as it grows, is subjected to material changes which must also be taken into account. In the old, if any lesion occurs, how much more difficult it is to rectify it than it would be at the middle period of life. The drunkard feels premature old age at this time in a great degree, so does he who has been ill fed and badly protected from the effects of climate ; such soon sink under disease particularly that of a malignant type. Thus, then, debility of body, however induced, either from a non-nutricious diet, or drink, or both, powerfully invervates the mind, which, in its turn, again preys on the body, and much more fully than some imagine ; thus both body and mind are plunged into an absolute state of misery, from which we may find it impossible ever to rouse them. That this is sorrowfully the case in a hot climate is but too true, greater by far than is to be met with in the colder and more temperate regions. Thus the system, from bodily, as well as mental depression, is but ill able to stand up against the operating cause of any of the more malignant diseases, and, when attacked, is saved with the utmost difficulty, especially in the more severe forms of such. It would, at present, be worse than madness to attempt to alter the opinions of the Hindoo, or any of

the other Native tribes, on this most important subject, since their religion, to which they are strongly bigoted, forbids such innovations. The stoutest amongst them, however, I suspect do not *entirely* live on rice and other sorts of curries, but take *a something* of a more substantial report. Let us, however, who are less scrupulous on these points, as connected with the belly, profit by their example, in other matters, and, in this manner, save as many lives as possible, recollecting also, that most important lesson which Livy narrates concerning the rebellion of the other powers of the body against that most important organ---the stomach.

ERRATA.

Page	8	Line	7 nervous absorption	read	venous
"	13	"	13 destruction	"	detractation
"	14	"	7 the head begins	"	the heart begins
"	49	"	7 at page 13	"	at page 7
"	53	"	26 and its prussic	"	and it is prussic
"	75	"	27 as nitre	"	as nitric
"	78	"	1 This take	"	This takes
"	82	"	12 measures restorted	"	measures resorted
"	91	"	11 they becomes	"	they become
"	111	"	34 is not all	"	is not at all
"	114	"	30 been conceded	"	been too hastily con- [ceded
"	120	"	11 draught	"	drought
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"	164	"	24 does more	"	does none
"	166	"	23 San Auton	"	San Anton
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"	194	"	17 so may say	"	some may say
"	215	"	3 of way faring	"	of war faring
"	225	"	12 from the arms	"	from the anus
"	241	"	25 ligomaticus	"	zigomaticus
"	263	"	1 with every	"	not with every
"	263	"	23 as that must when	"	as when
"	270	"	7 phelbotomising	"	phlebotomising
"	273	"	4 been duration	"	been in duration
"	295	"	14 <i>blood withdrawn</i>	"	<i>blood are withdrawn</i>
"	309	"	13 not be	"	now be
"	325	"	21 qr. 3	"	qr ij
"	334	"	14 stimulant	"	stimulants
"	340	"	29 5l. 5	"	5 h. 55. m.
"	352	"	6 Epispartics	"	Epispastics
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